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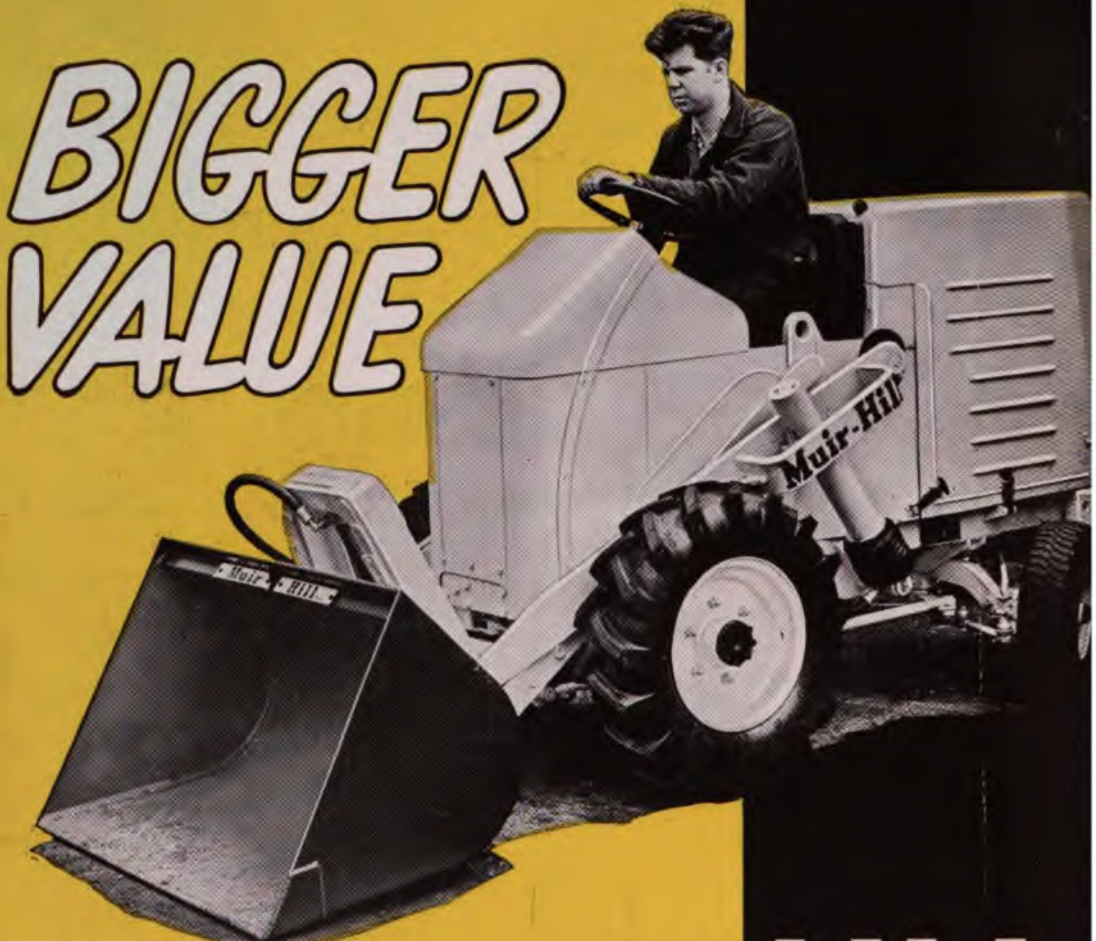

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. August 13, 1959 No. 2227

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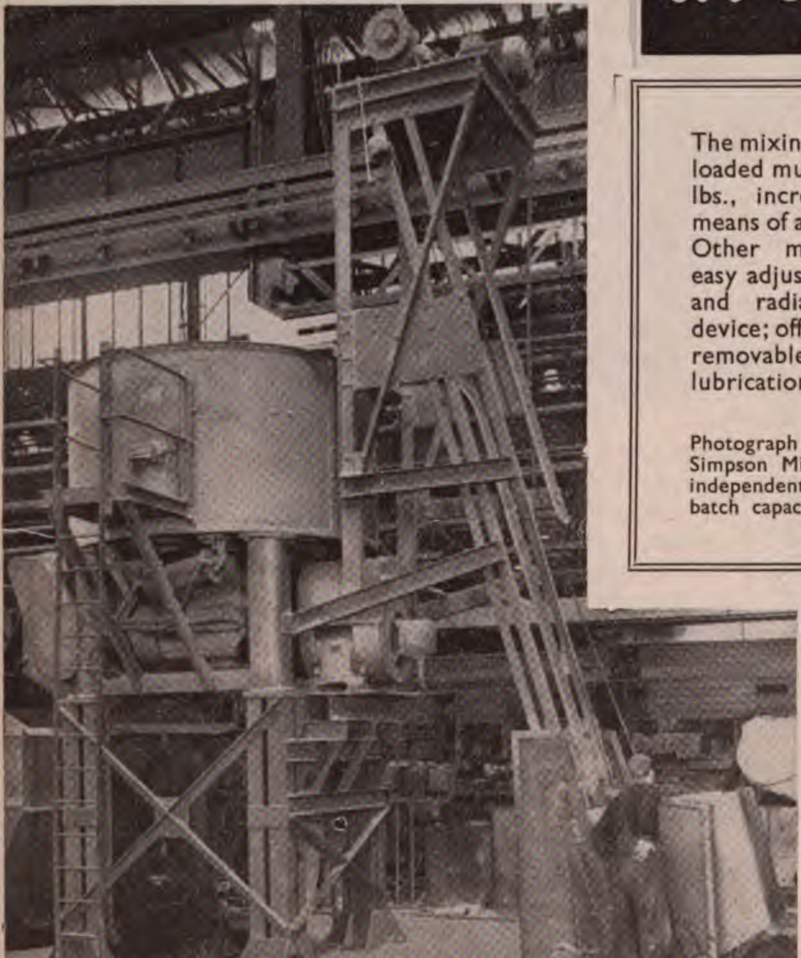
Another example of AUGUST-SIMPSON Mix-Mullers *in action!*



The mixing unit incorporates spring-loaded mullers, each weighing 1,600 lbs., increasing to 4,000 lbs. by means of adjustable spring pressure. Other modern features include easy adjustment of plows vertically and radially by positive screw device; offset mullers; sand sampler; removable panel in crib; centralised lubrication, etc.

Photograph shows a No. 3F size August-Simpson Mix-Muller Bucket Loader and independently driven Aerator. Large batch capacity—approximately 4,000 lbs.

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FOUNDRY
TRADE JOURNAL

Vol. 107 AUGUST 13, 1959 No. 2227

The 1958 Factory Report

A post-war—if not an all-time—record has been achieved by Mr. T. W. McCullough, H.M. Chief Inspector of Factories, in the speed of publication of his Annual Report.* Over last year there has been an improvement of at least two months, whilst compared with a few years ago, publication has been advanced by a full year. Happily, the Report announces a further—actually a four per cent.—reduction in total accidents below the 1957 figures, the figures being from 174,713 in 1957 to 167,697 in 1958. The fatal accidents, however, rose slightly in the period, from 651 to 665. The foundry accidents reported in the two years show a reduction from 8,401 to 7,820; whilst those resulting in death fell from 26 to 17. This overall reduction in foundry accidents amounts to 6·9 per cent.—or nearly double that of the country as a whole. However, there is no room for complacency, as the frequency rate in foundries, though it has declined from 2·74 to 2·66, is still second highest in the list. One foundry employing about 500 men is known where the rate is as low as 1·45!

At the Press conference when the Report was issued, Mr. McCullough attached great importance to the teaching of safety precautions to students at technical colleges, as a long-term policy. If nothing more is done than to make future executives conscious and appreciative of the importance of accident-prevention, the time devoted to the study of this subject will be well worthwhile. One other very important fact came out at this conference and that was that a statutory obligation is placed upon employees to wear the safety clothing and appliances provided either at cost or free by the employer. There is a direct relation between fire- and accident-prevention and a very important section of the Report is devoted to this subject.

From the Chief Inspector of Industrial Health, a second report (3s. 6d.) was presented. Unfortunately, it shows no reduction in the incidence of pneumoconiosis in the foundry industry as revealed by death certificates. Here the statistics are divided into iron, steel, non-ferrous and mixed foundries. Unfortunately, it is not possible to attach very great importance to the message they purport to convey—in relation to the relative risk of various jobs—as no doubt the figures relate, in each case, to the last job worked by the deceased person, whereas for proper interpretation, the whole industrial history of the man should be taken into consideration. Ex-miners, where silicosis is much more rife, sometimes finish their career in a foundry or, again, men transfer from one type of foundry to another. There were 50 cases of dermatitis voluntarily notified by the foundry industry, but here again the real position cannot be interpreted until further information is forthcoming. Where there is a risk of this disease, it is as well to employ dark-haired people, as the fair (of both sexes) seem to be much more prone!

---

* Annual Report of the Chief Inspector of Factories for the Year 1958, published by H. M. Stationery Office, York House, Kingsway, London, W.C.2; price 5/6 net.

This is the first normal issue of THE FOUNDRY TRADE JOURNAL since June 11 (No. 2226), publication of the intervening issues having been stopped by the prolonged dispute in the printing industry. The dispute was none of our making and we greatly regret the inconvenience caused to readers and advertisers by the break in publication.

Now that work in the printing industry has been resumed, we have endeavoured in this issue to include much of the news of recent weeks, inevitably at the expense of some of our quota of technical contents.

Correspondence

NOVEL PRESENTATION

To the Editor of FOUNDRY TRADE JOURNAL

SIR,—When you are again in full publication, could I trespass on your columns to express my appreciation of a very unique presentation made to me on my retirement (from the managing directorship) of Associated Builders Merchants, Limited.

The presentation was a beautifully bound volume (32 pages) covering some 400 signatures, from both home and overseas, of persons with whom I have had personal contact during the 30 years from the inauguration of ABM. Its compilation must have been a long and arduous task, and by reason of this is doubly appreciated.

The volume was inscribed as below, and some of the signatories have expressed a desire to see the book in its final form. Accordingly, I have arranged to return it temporarily to the ABM offices, where it is available for inspection.

If you will be good enough to publish this, it will advise all signatories of my deep appreciation

Yours, etc.

P. G. DONALD

23 The Abbey, Romsey, Hampshire.
July 17, 1959.

> **TO PERCY DONALD**
>
> **This memento, signed as it is by so many of those who have collaborated with you in the service and development of Associated Builders Merchants, Limited, seeks to express something of the deep appreciation the signatories have felt for your outstanding ability and integrity and the breadth of your vision**
>
> **We remember with pleasure the time spent in your company and the great service you have so freely rendered to industry and to your country.**
>
> **May all happiness be with you in your retirement.**

Export Licensing Control

The Board of Trade announce certain changes in export licensing, in force from June 29. The latest Amendment to the Export of Goods (Control) Order removes export control from copper powder. It slightly amends the liability to licensing of a few goods or re-defines them to clarify the scope of the control. The list of goods affected includes gyroscopes, control equipment, nickel, cobalt and cobalt compounds, and mechanically-propelled road vehicles. Copies of the new Order (the Export of Goods (Control) (Amendment) Order, 1959 (S.I. 1959 No: 1953) price 3d. (by post 5d.)) are available from H.M. Stationery Office, Kingsway, London, W.C.2, and branches.

The Hon S. G. CATTO, managing director of Morgan Grenfell & Company, Limited, and Sir STANLEY HARLEY, chairman and managing director of the Coventry Gauge & Tool Company, Limited, have been appointed members of the Advisory Council of the Export Credits Guarantee Department. Sir Stanley Harley is also president of the Gauge and Tool Manufacturers' Association, and vice-president of the National Federation of Engineers' Tools Manufacturers. Other directorships held by the Hon. S. G. Catto include that of the General Electric Company, Limited, and the *Mercantile* Bank, Limited.

Retirement of S. H. Russell

After 57 years with the family business of S. Russell & Sons, Limited, Bath Lane, Leicester, Mr. S. H. Russell, O.B.E., has retired from the company, but his services are to be retained in a consultative capacity. To mark this event his colleagues on the board organized a complimentary dinner at the Grand Hotel, Leicester. The principal guest presided, and at the high table he was surrounded by his family, who were so numerous—18 all told—that they spread over to adjoining tables. The company mustered more than 150, the visitors coming from all parts of the country. Trade associations were represented by Sir Frederick Scopes, Mr. Noel Newman, Mr. M. J. Glenny, Mr. K. Marshall and Mr. G. Judd; research by Dr. J. G. Pearce; technology by Mr. V. C. Faulkner, Mr. J. W. Gardom and Mr. G. Lambert; customers by Mr. G. H. Grawcock and Mr. R. T. Mattinson, and suppliers by Mr. S. Perry. Mr. Bert's (S. H. Russell's) health was proposed by his brother Mr. George, who now takes over the chairmanship of the company. In his speech he reviewed the career of the principal guest, stressing the work he had done in the field of education—where for many years he was chairman of the Foundry Advisory Committee of the City and Guilds of London Institute; his leadership of the productivity team which visited the USA; his work for the Rotarians and his participation in civic matters.

Mr. S. H. Russell in reply was obviously sincere in his appreciation of the co-operation he had received not only from the members of the board but from the workpeople. Mr. P. A. Russell B.SC., proposed the guests and Sir Frederick Scopes replied. After the speeches an entertainment was provided by Mr. Peter Cavanagh.

IBF Golfing Society

This year's meeting and competitions of the IBF Golfing Society are to take place at Woodhall Spa, Lincolnshire on Saturday and Sunday, September 26 and 27 when there will be the usual party arrangements at the Golf Hotel. Full details will be published in due course, but meanwhile those intending to participate are requested to reserve the dates. New members and non-playing members and their wives are very welcome at this event, which includes social gatherings. Those interested in joining the Society should write to the secretary, Mr. J. Graham Phillips, c/o Harper Phillips & Company, Limited, Albion Foundry, Eastgate, Grimsby.

TO DEAL WITH increasing continental sales, F. Perkins, Limited, the Peterborough diesel-engine manufacturing company, is dividing Europe into two separate export zones. Manager of the west European zone, comprising Italy, France, West Germany, the Benelux countries, Austria, Switzerland, and Algeria, is Mr. Edward Bartlett.

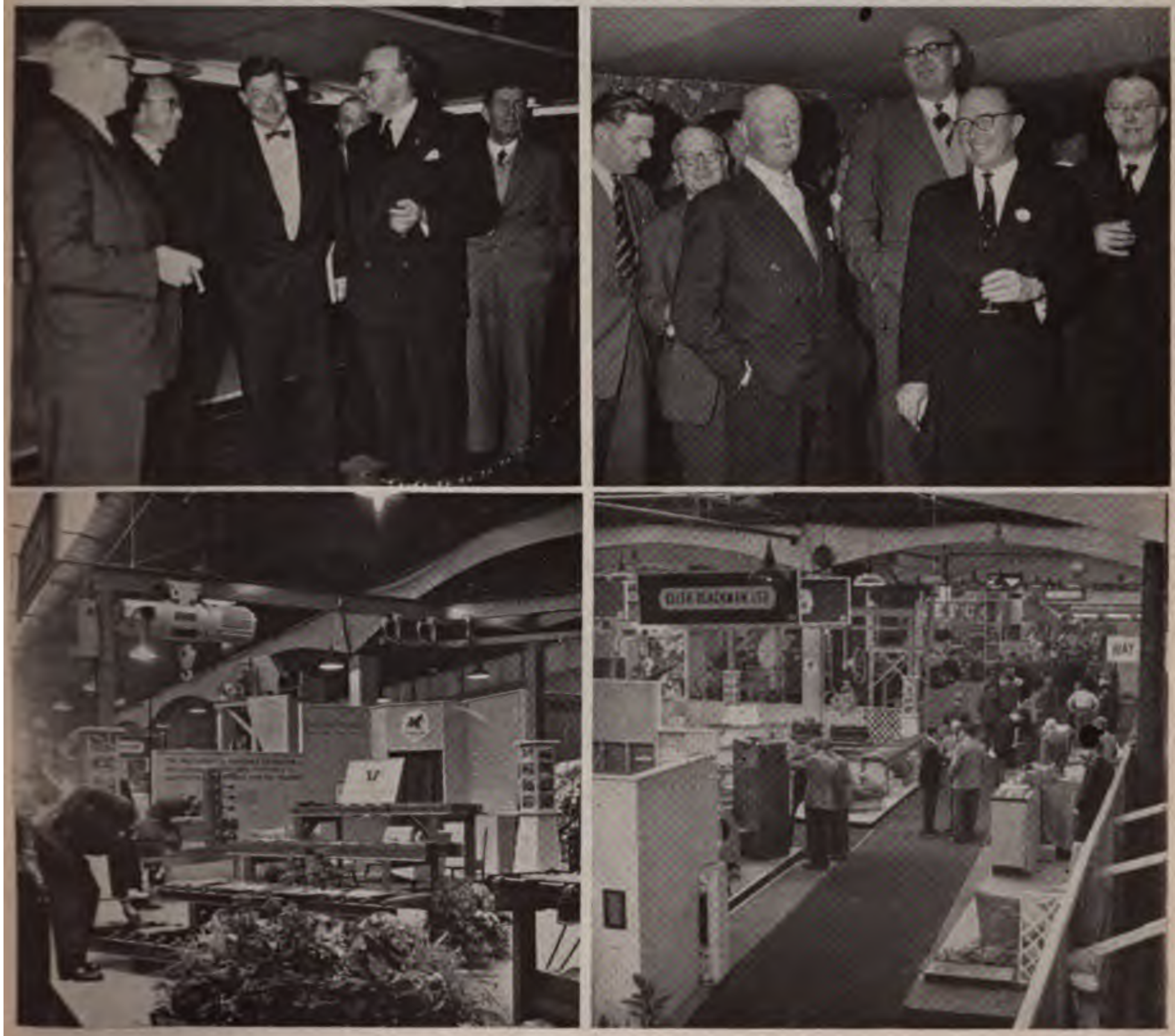
ORDERS WORTH approximately £250,000 for diesel-electric-locomotive gearing have been secured by the general gear division of David Brown Industries, Limited, Huddersfield. Part of the order covers the supply of about 70 sets of diesel-engine synchronizing gears of the spur type, case-hardened and profile ground to exceptional limits of accuracy. The rest of the order covers a large quantity of traction gears—case-hardened and profile-ground spur pinions and wheels of resilient design with hardened teeth. The new locomotives will be built at Derby for ultimate use by the Midland Region of British Railways.

Exhibition Aftermath

Comments, Illustrations and Conclusions arising at the Bingley Hall Foundry Show

Continuing and even surpassing the forecast of the JOURNAL'S first-report on the Exhibition which was held in Bingley Hall, Birmingham, from May 21 to 30, the final week's showing was a revelation to all who participated, whether as standholders, Exhibition staff, organizers or visitors. The official

(Top left)—Friday, May 22, was the occasion of the visit to Bingley Hall of the official parties of the Council and principal officers of the Institute of British Foundrymen, and of the Worshipful Company of Founders. The illustration shows (from left to right): Mr. A. E. Peace (president, IBF), Mr. G. C. Paterson (president, Foundry Trades Equipment and Supplies Association), Mr. L. H. Durdin (immediate post-president, American Foundrymen's Society), Mr. G. W. Ilsley (Master of the Company) and Mr. H. S. Newton, (top right)—this group, taken when the Wales and Monmouthshire, and Bristol and West of England, branches of the IBF visited the Exhibition, includes (r. to l.): Mr. D. L. Richards (IBF junior vice-president elect), Mr. G. C. Paterson, Mr. N. P. Newman, Mr. R. B. Templeton and Mr. A. S. Wall; (bottom left) view from the FOUNDRY TRADE JOURNAL *stand in Bingley Hall; (bottom right) view fron north corner of the hall, looking west.*



(*left*)—*Mr. M. M. Hallett* (*senior vice-president of the Birmingham branch of the IBF*) *addressing the luncheon party during the official visit of the Birmingham branch;* (*right*)—*north corner of one of the bays at Bingley Hall, looking east.*

figures for the attendances on the various days—not including the large numbers who came in parties on a single ticket, or who obtained admission unrecorded—are as follow: May 21, 576; May 22, 1,086; May 23, 2,041; May 25, 1,094; May 26, 1,623; May 27, 1,743; May 28, 1,768; May 29, 1,401, and May 30, 2,471. It is estimated that unrecorded admissions would show at least another 200 on these figures, making a total of well over 15,000, a figure of which everyone who has had anything to do with the Exhibition can be very proud. Overseas countries represented among the visitors totalled at least 27, nationals from the following countries being welcomed officially: Argentina, Australia, Belgium, Canada, Czechoslovakia, Denmark, Egypt, Eire, Finland, France, Germany, Holland, India, Israel, Italy, Japan, New Zealand, Nigeria, Norway, Pakistan, Rhodesia, South Africa, Spain, Sweden, Switzerland, USA and USSR. As was recorded in the June 11 issue (see *Leader*, page 681), the

(*left*)—" *Getting down to it,*" *a salesman explains a pertinent feature of his machine;* (*right*) *the official party, during their tour of the Exhibition, stop to watch a miniature cinema show, and listen to the commentary telling the story of how a foundry operates* (*just one of several admirable visual aids used in the Exhibition*).

Right—Signing of a £16,000 order for a completely automatic foundry unit for producing small malleable castings (a scene photographed on the first day of the Exhibition).

Left—"Seen thro' the glass darkly", some members of the Council of the FTE & SA inspecting a showcase model of an automatic moulding plant.

astounding wealth of well-informed comment from even the humblest visitor on the products shown was one of the most remarkable features, and even in cases where no direct business accrued, every firm received on their stand large numbers of really technical foundrymen and were pleased to meet "in the flesh" many with whom they had corresponded with for years.

Around the Exhibits

Obviously it would be invidious to single out for special mention any particular exhibits from such excellent stands. There were, however, a number of machines and foundry supplies which were shown to foundrymen at Bingley Hall for the first time, and the majority of these will be featured in the JOURNAL'S "Equipment and Supplies" section in due course. Amongst these were automatic moulding machines and completely-automated plants, several new corebonding materials, coreblowers both for shell and ordinary cores, along with an infinite number of improved models. In

Other personalities present on May 22: (left-hand illustration) Dr. A. B. Everest (IBF past-president) with Mr. L. H. Durdin (AFS retiring president); (right-hand illustration) Mr. C. H. Wilson (extreme left), Mr. F. Webster, Mr. V. E. Upton, Mr. L. Sawers, Mr. G. Lambert (IBF secretary), Mr. T. Whitelaw (from Australia) and Dr. Everest.

Tasteful displays by models or "live" illustration were a feature of nearly every stand.

addition to the Association stands, there were those of manufacturers of apparatus ancillary to founding processes—for example, makers of showerbaths and wash-rooms, etc. The Clean Air Act also had its devotees in a great variety of exhibits designed for air (or other effluent) collection and purification. Great emphasis was also placed on methods for cleaning castings and making them more attractive in every way to consumer industries.

Emphasis on Evolution

The emphasis of the Exhibition was not so much on new models as on a wealth of detailed evolutionary development of existing designs of equipment. Added to this, there was a plethora of display devices ranging from "live" exhibits to animated models and ciné-films. It was as if each exhibitor had taken the Exhibition as a personal challenge to his ingenuity to show even mundane products in an eye-catching manner. Above all, this challenge for novelty had been taken up in friendly rivalry or co-operation with other standholders, according to whether the opposite numbers exhibited competitive or complementary products. This spirit of friendliness among exhibitors transferred itself immediately to all the visitors, so that each day's

View of the south corner of the hall, from the balcony.

of the west corner of the hall, rom the balcony.

ring seemed to represent a large happy family undrymen, all enthusiastic about their voca- Many exhibitors borrowed plant and equip- from each other and showed it to mutual ad- ge. In fact, this practice was so widespread it called to mind an amusing cartoon of a on which were placarded examples of rowed equipment" in great number, while the holder's own contribution was conspicuous by significance! Again, it was quite usual for holders to borrow useful apparatus one from ier during the run of the Exhibition (one 's representatives cooked their "hot-dogs" in ontinuous oven on a neighbour's stand). To nue in the humorous vein, at one time the r thought that a pendulum conveyor would have to be installed in Bingley Hall to carry the official catalogues around!

Many Customers

Joking aside, it is beyond any shadow of doubt that all of the thousands who visited the Exhibition, no less than the exhibitors themselves, carried away something of great value to their future work, the full benefit of which will be reaped over many years to come. In hard cash also, the exhibitors must be well satisfied with their efforts. In many cases, the whole of the plant shown on stands was sold before the Exhibition closed, and on every hand reports came in of hundreds of really worth-while enquiries. The foundry trades' equipment and supplies business has been somewhat in the dol-

lems were discussed man- an in a friendly atmosphere.

Mr. A. E. Peace (then IBF president) replying to the official welcome on Friday, May 22, with (seated l. to r.) Mr. C. H. Wilson and Mr. L. H. Durdin.

drums for a year or two, but this Exhibition seems to have marked a real upward turning-point in UK and overseas business.

Official Visits

In addition to the official parties recorded in the report of the Exhibition appearing in the JOURNAL of May 28, there were the following bodies represented on Friday, May 22—Birmingham Technical College, Institute of Vitreous Enamellers, Association of Bronze & Brass Founders, National Society of Master Patternmakers, Silica & Moulding Sand Association, Foundry Coke Merchants' Association, Vitreous Enamellers' Association, National Foundry College, Joint Iron Council, Council of Ironfoundry Associations, Board of Trade, and representatives of the national, provincial and technical Press.

Saturday, May 23, was the first official visit of the Birmingham branch of the Institute of British Foundrymen, led by their vice-president, Mr. M. M. Hallett. (Owing to the large number of Birmingham members wishing to attend, a second official visit was arranged for this group later that week.) Attending on the Monday were members of the Council of the National Society of Master Patternmakers, headed by their president, Mr. W. D. Hartley; members of the Bristol and West of England branch of the Institute of British Foundrymen, led by Mr. D. L. Richards (IBF junior vice-president elect); the Wales and Monmouthshire branches of the IBF, led by Mr. L. Duddridge (president), Mr. Randall, Mr. Hyde and Mr. A. S. Wall. On this day, also, 20 students from Cardiff Technical College were brought along by Mr. Kaye. Tuesday, May 26, saw visits by members of the Council of the Association of Bronze & Brass Founders, members of the Executive Council of the British Steel Founders' Association, and members of the Newcastle, Scotland, Tees-side and Sheffield branches of the IBF. Wednesday, May 27 was the date chosen for the second visit of the Birmingham branch of the IBF, and on Thursday, May 28, the following official parties were welcomed—the Executive Committee of the Joint Iron Council, of the Council of Iron Producers and of the Council of Ironfoundry Associations, the management committee of the National Foundry Craft Training Centre, and members of the Lancashire and West Riding of Yorkshire branches of the IBF. The official parties attending the Exhibition on Friday, May 29, consisted of members of the London branch of the IBF and members of the Executive Committee of the Light Metal Founders' Association. On the closing day, Saturday, May 30, the Exhibition organizers were pleased to welcome members of the East Midlands and Lincolnshire branches of the IBF.

Group of founders conversing on the opening day, May 21, (l. to r.): Mr. G. C. Paterson, Mr. G. W. Ilsley, Mr. James W. Early (president, J. S. McCormick Company, Pittsburgh, USA) and Mr. R. Sutcliffe.

Comment on the Exhibition

Reference has already been made in the JOURNAL to comment on the Exhibition by a leading manufacturer of German plant, and it is interesting also to record comment from two other quarters. The *Financial Times* occupied the width of three of its columns to proclaim "Wide Interest in Foundry Exhibition." Under this headline appeared the following—"The response to the Foundry Exhibition here in the first few days has been such as to merit consideration of widening its future scope to the international sphere." Among the compliments received one of the pleasantest came from Mr. L. H. Durdin, president of the American Foundrymen's Society, who, after a tour of the Exhibition, observed "this show hasn't been put on by a bunch of amateurs—these boys know what they are doing." The views of one exhibitor put into a nutshell a fair reflection of the feeling of most of the firms participating in the Exhibition. He said, "This is, without doubt, the finest foundry exhibition I have ever seen anywhere—it is much better even than the Cleveland Show. Most important, it demonstrates the tremendous strides that this foundry-supplies industry has made during the past few years. In many respects, we are now taking the lead instead of having to follow the United States and Continental manufacturers. As for the visitors, who have been coming in every day in truly astonishing numbers, my experience—and it is that of all the exhibitors—is that they come here to talk business and to do business. The overseas interest has been particularly gratifying, and I am sure that for all of us the coming months will prove that in every respect this has been a first-class exhibition."

Conclusion

All thoughts are now turned to what the future will hold in the way of UK foundry exhibitions. Some are requesting further exhibitions on a local basis within a short time, but the general concensus of opinion is that three or four years must elapse before the majority of plant manufacturers will have anything substantially new to show. It is understood that in three or four years' time Birmingham may have a large new Exhibition Centre, and that some new hotels will have been built. If this is so, the only objection to holding a further foundry exhibition in Birmingham would be the seeming reluctance of foreign visitors to travel out of London.

Whatever is decided there is no doubt that foundrymen, having experienced the "taste of freedom" as a result of the Bingley Hall show, will not easily be led into merely sharing exhibitions with other organizations in the future.

China used Clay Moulds

The art of clay moulding dates back in China for more than 3,000 years, when fine bronzes which are famous all over the world were being made by that method. With the introduction of sand-mould casting, however, the art of clay moulding died out, excepting in the rural areas, where it remained in use for the local production of iron pots and pans, ploughshares, and other simple castings. Recent reports show that the method is now being vigorously re-popularized, because experience has shown that it can be applied to increase output and reduce costs. At the Tangshan Casting and Forging Plant, in Hopei Province, for instance, it is stated that clay casting has enabled the monthly output to be increased sixfold—from 0.27 tons, to 1.7 tons, per square metre of moulding area—in the past five months, without any increase of personnel or of moulding area, while at a foundry in Shanghai it has been said to be possible to reduce the cost of moulding to as little as 5 per cent. of what it used to be when dry-sand moulds were used there.

The report goes on to state that the technique of clay moulding is quite easy to master, and its products are of high quality. Each mould can be used for anything like between 50 and 200 castings. It has been taken up generally, therefore, in the foundries of Shanghai, Shenyang, Tientsin, Wusih and other places, for casting machine parts for metallurgical, mining, power and general machinery, and machine-tools. Experience with it over the past year has enabled improvements in technique to be effected, in particular by the introduction of practices derived from modern sand-mould casting.

Clay moulding is now being used for small and medium castings, for heavy castings weighing over 10 tons, for castings with walls but ½-mm. thick, and even for precision castings. It is claimed that its introduction is likely to contribute in important measure to the achievement of China's projected doubling in value of the country's output of machine-tools this year.

The British Cast Iron Research Association announces that with effect from January, 1960, the BCIRA *Bulletin and Foundry Abstracts* will be incorporated with the BCIRA *Journal of Research and Development* and the new publication will be henceforth known as the BCIRA *Journal*. Publication will be bi-monthly as before.

"Wasters" due to Faulty Running

By "Coroner"

Techniques employed in the country jobbing foundry are often different to those practiced in a production shop. In some cases these jobbing foundry methods are justified, but on many occasions they tend to cause scrap castings, or "wasters."

The writer was recently consulted about a batch of castings of a simple nature, a percentage of which were scrapped. The castings were solid lumps, 3-in. sq. by 2½-in. deep, with a boss 2-in. dia. and ¼-in. deep on the bottom face as-cast. The complaint was that, on machining the top face of the castings, a number had exhibited gas-holes about ⅛-in. below the surface. As each casting was provided with a heavy self-feeding riser the reason for the defect was not at first apparent.

On investigation, the writer learnt that four castings were made in one box, each casting being poured individually through its self-feeding riser. This gave a clue to the cause of the trouble, and it was eventually determined that, after the first casting had been poured, the gases in the adjacent sand expanded and travelled through to the adjoining mould-cavity. The speed of transit of this gas was such that it did not affect the second and third castings poured, but, by the time the last one was cast, sufficient gas had percolated into the fourth mould to cause trouble, since the mould was poured through the riser and thus tended to trap the gas in the mould.

Experimental work revealed that if each of the four feeders was connected to a common runner, so as to fill each cavity at the same time, better results were obtained. After further research, it was found that if a block runner was used which just touched each of three castings and dispensed with the feeders, then trouble-free castings resulted. Furthermore, the yield was increased because of the saving in feed metal.

The Iranian Minister of Customs and Monopolies has issued a statement to the effect that any goods sent to Iranian posts in the Persian Gulf which are marked, or accompanied by documents "Arabian Gulf" (*i.e.* instead of Persian Gulf) will be unacceptable to the Iranian authorities and the unloading of such goods will be forbidden.

ESC's Largest Casings

The first pair of two identical sets of cast-steel steam-turbine casings, ordered by Metropolitan-Vickers Electrical Company, Limited, from English Steel Castings Corporation, Limited, was despatched recently from ESC's Grimesthorpe Works in Sheffield. A second pair was then being fettled and pickled, and is scheduled for delivery this month. The casings are to be used in the two largest single-axis turbine-generators ever to be built by Metropolitan-Vickers. Rated at 200 mw. and 3,000 r.p.m., they are amongst the largest-capacity machines of their type in this country and are destined for the Central Electricity Generating Board's new Willington "B" power-station, which will be situated adjacent to the river Trent, south of Derby.

Difficulties of Manufacture

The casings break ESC records, since although not the heaviest, they are almost twice the size of any turbine casings previously manufactured. ESC technicians say that the manufacture of these casings was a much more difficult assignment than that of producing say a 185-ton steel casting, as, in addition to the intricacy of the job (particularly in the coremaking), they had continually to bear in mind that the casings would be required to resist operational temperatures and pressures far in excess of those allowed for in previous jobs of this type. With the moulding of the two bottom sections an unusual procedure had to be adopted: the pattern was rammed whilst upside down, the box rolled over, the pattern removed, and the mould then lowered into the pit (see Fig. 1).

Dimensions and Inspection

The top sections, which contain an integral steam chest, weigh 13 tons 7 cwt. in rough-machined condition, and the bottom sections 11 tons 8 cwt. Because of their unusually large dimensions the casings were cast in pits from moulds prepared in boxes. When assembled, the casings are 11 ft. 1 in. dia. by 9 ft. 2¼ in. long (the two sections fit together to enclose the turbine rotor and blades). After machining (Fig. 2), the first pair underwent exacting X-ray, gamma-ray and magnetic crack-detection tests, after which the customer's inspector announced that he was completely satisfied with the results of this rigorous examination.

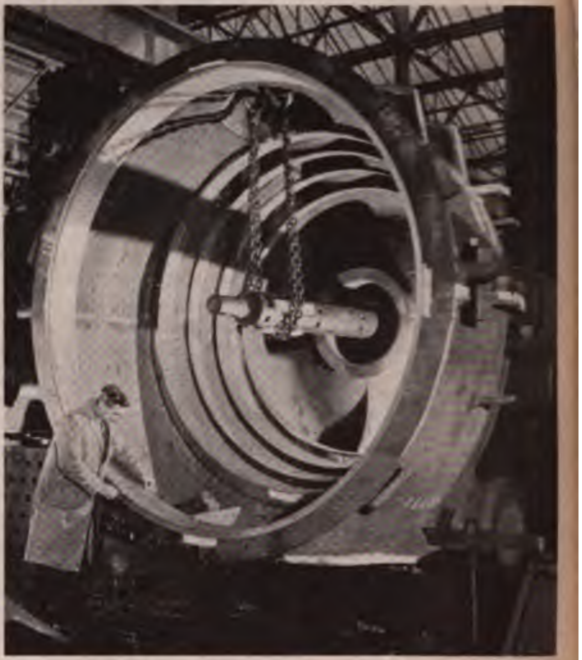


FIG. 2.—*One of the casings in the Hawke Street planing shop of English Steel Corporation, Limited, Sheffield, after rough machining.*

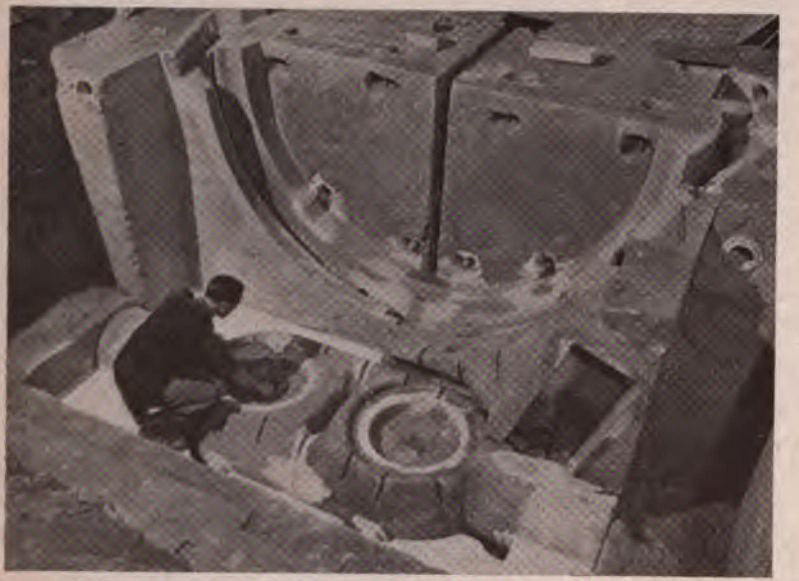


FIG. 1.—*Craftsmen at work in the Grimesthorpe foundry of English Steel Castings Corporation, Limited, Sheffield, on one of the moulds for the record cast-steel steam-turbine casings. The man shown is making up vents from one of the large cores. Before closing the mould much preparatory work of this nature is entailed to prevent entry of metal at joints, etc.*

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* Based on information published in the ESC *Information Bulletin*.

Bridging the Gap

ıg the past few weeks, whilst negotiations
:en going on to settle the printing dispute,
umulation of news of day-to-day events in
ıdry industry has mounted up. It is thought
ıders need to be informed of the happenings
the unavoidable break in publication, and
't would be impossible to report each item
ıally, an attempt to " bridge the gap " has
ıade in the following condensed summaries.
ıped that in this way the accumulated news
rendered into a palatable whole in such a
as to avoid mental indigestion.

ʒs, Exhibitions, Courses, etc.

ıugh most institutions and associations dis-
e meetings during the summer months, news
from the ASSOCIATION OF BRONZE AND BRASS
ıRS of a meeting of members of the Lancashire
heshire area at the Engineers' Club, Albert
Manchester, in June, when Mr. G. H. Charsley
ed the assembly on the subject of recruitment
ining in the foundry industry. Another meeting
ıt of the Australia (Victoria) branch of the
TE OF BRITISH FOUNDRYMEN, when Mr. J. Fram
International Harvester Company, and Mr. W.
United Malleable Company, dealt with different
of "Machine Moulding." The INSTITUTE OF
FOUNDRYMEN held its ninth annual general
ʒ in June at the India Exchange Place, Calcutta.
on. Sardar Swaran Singh, Union Minister for
Mines and Fuel (Government of India), ad-
the opening session, and during the session,
R. Nijhawan, PH.D., F.I.M., F.N.I., was inducted
e chair by Mr. N. G. Chakrabarti, the retiring
nt. A record number of foundry technologists,
fficials of the Government of India, presidents
mbers of Commerce, etc., attended the meeting.
ry interesting exhibition of pressure-die-castings
ld for one week in June at the ENGINEERING
:, Birmingham. Exhibits included castings from
and many European countries and the organ-
f the exhibition—the Zinc Alloy Die Casters
ıtion and the Light Metal Founders Associa-
re to be congratulated on their production
ery successful show. In July two exhibitions
eld at the Centre, one organized by Square D,
l, of London, and the other by the Building
At the British Industries Fair, held in Lisbon,
gineering Centre organized a successful group
at which the products of 25 British firms were
w. Among inquiries received were several for
:atment furnaces, electrically-driven air com-
s: anodized aluminium castings and centrifugal
machines for ferrous cylinder-liners. It is
ıced that a list is obtainable from the Centre,
.uguese importers and agents who would like to
nt British firms for the following products:
tings, centrifugal casting machines, cooking
washing machines and refrigerators.
latest news of the GEORGE KENT MOBILE EXHI-
is that its current overseas tour will include a
ɔ the steelworks of Empresa Nacional Side-
S.A., at Aviles, Spain, where a course in the
ompany's customer training system is expected
n progress, and the exhibition will have the new
ıusual rôle of "ambassador."
a refresher course held recently by FERRO
.S, LIMITED, Ounsdale, Womburn, Wolver-
ɔn, the following papers were presented:—
"New Enamels and their Uses," by Mr. A. H. Symonds: "Dry Process," by Mr. E. A. Lawton; "Application Procedure," by Mr. A. T. Issitt; "Sub-sieve Particle Size," by Mr. J. F. Brown; and "Detergent Tests and Detergent Resistance of Enamel Finishes," by Mr. F. G. Morriss. Presumably copies of the papers are available from the company at the address quoted. Excellent courses in metallurgy are detailed in the prospectus for 1959-1960 of the SIR JOHN CASS COLLEGE, Jewry Street, London, E.C.3, which is now available.

Orders Received

Orders worth more than £1,000,000 have been recently received by several companies, amongst them being the CLEVELAND & ENGINEERING COMPANY, LIMITED, Darlington, who have been awarded a £1,346,099 contract for a steel-and-concrete suspension bridge across the river Tamar, near Plymouth. The bridge is expected to be completed in 1961. A £1,250,000 contract has been received by the GENERAL ELECTRIC COMPANY, LIMITED, who will be the main contractors for a complete iron-ore preparation plant at the Redbourn Works of Richard Thomas & Baldwins, Limited, at Scunthorpe. PRATT BROTHERS, LIMITED, of Oldham, is yet another company to secure an order to the value of more than £1,000,000; this is for textile machinery for Poland, and is reported to be the largest yet received for British textile machinery for Poland.

A contract to build a lead- and zinc-treatment plant at Cockle Creek, near Newcastle, New South Wales, has been won by the Australian subsidiary of the Simon-Carves engineering group in Britain, SIMON-CARVES (AUSTRALIA) PTY., LIMITED. F. H. LLOYD & COMPANY, LIMITED, has submitted a tender to the Indian Railway Board, under which the company will accept responsibility for the design and operation of a steelfoundry at Chittatanjon, West Bengal. It is understood that the tender has been accepted. A Dutch firm, N. V. KONINKLIJKE MAATSCHAPPIJ 'DE SCHELDE,' of Flushing, has received an order from the Royal Mail Lines, Limited, of London, for the reconstruction of the passenger vessel Andes. An order worth more than £250,000 has been placed by the Polish organization, Varimex, with Prince Smith & Stells, Limited, textile-machinery makers, Keighley, for worsted and synthetic spinning machinery.

In face of strong competition from Continental firms, the FALKIRK IRON COMPANY, LIMITED, has been awarded a contract for the gas-fired cooking equipment and stainless-steel appliances for the kitchen and cafeteria at the new permanent headquarters of NATO, at Dauphine, France.

Extensions

Reports of companies extending their businesses concern the AUDLEY ENGINEERING COMPANY, LIMITED, which is opening new premises at Gloucester and on Merseyside. At the company's Newport plant, where some 900 are employed, production is to be expanded. One of the George Cohen 600 group of companies, GAMET PRODUCTS, LIMITED, has also opened a new factory. It is located at Hythe, Colchester, and manufacture will be solely of highly-specialized precision bearings for the machine-tool industry. At Glenrothes, Fife, a new factory has been opened by ANDERSON BOYES & COMPANY, LIMITED, coalmining-machinery manufacturers. The BRUSH ELECTRICAL ENGINEERING COMPANY, LIMITED, is reported to be purchasing the rotating-machines section of Verity's, Limited, Birmingham, which company recently went into voluntary liquidation. Manufacture of the machines

mingham for the time being, but
nanufactured at the Brush works

ne the news that the MAGNET COVE
N (Magcobar), Houston, Texas, is
ion of the construction of a new
ndry research building at Tolling
USA. Magcobar, one of the
produces western and southern
undry industry.

of reports of company activities
usiness. For example, the man-
otes, Limited, MR. BRIAN ROOTES,
he company is stepping up produc-
ne plant by 40 per cent. to keep
At the DISTINGTON ENGINEERING
Vorkington, where a four-day week
ion since May, employees were
be back on a five-day week, and
continue for some time. BRITISH
Brighouse, Yorkshire, has recently
nical liaison and licensing agree-
n Monorail Company, Cleveland,
gotiations were carried out, during
y Mr. Eric Russell, sales director
Limited, the Loughborough crane
recently purchased a controlling
any.
de by GENERAL MOTORS-HOLDENS,
reached the highest figure in the
early £A30,000,000. A net profit
) was declared after allowing over
ation and £A3,750,000 for depre-
r 1958 were worth £A116,000,000.
have bought all the shares in
stic Heaters, Limited, and also
interest in British Oil Burners,
acquisition of these two businesses,
anaging director, and Mr. H. E.
er of Tecalmit, Limited, have been
director of the companies; Mr.
will continue in his position as
f both companies, and Mr. K.
pointed sales director of Industrial
Limited.
COMPANIES, LIMITED, of Sheffield,
lders in Concast A.G. of Zürich,
loemann Company of Düsseldorf,
es Forges et Acieries de la Marine
.. Paris. Mr. G. N. F. Wingate,
nanager of Distington Engineering
(a United Steel subsidiary) has
board and other new members
osch., of Krefield, Dr. B. Knapp,
Ir. Henri Malcor, of Paris. The
ving Rossi of New York. A
greement is announced between
USTRIES, LIMITED, 11a, Albemarle
.1 and the D. A. Stuart Oil
Chicago and Detroit (in associa-
). A. Stuart). In consequence of
h operates from August 1, Amber
s appointed sole distributor and
Eire, South Africa, Australia and
the products of D. A. Stuart.
uly 2, a Swiss delegation visited
ade arrangements for the rest of
oods still subject to restrictions
me increases were agreed. During 1957, Columbia imported US$66,000,000 worth of iron and steel and manufacturers, representing 13.6 per cent. of the country's total imports. According to *L'Usine Nouvelle*, France exported to Great Britain, during the first five months of this year, 166 *tonnes* of malleable-iron tube fittings. In June, Sheffield University Court approved an ordinance affiliating colleges to the University for granting Master's degrees in pure science, engineering and metallurgy. The Colleges are the Sheffield College of Commerce and Technology, Barnsley College of Technology, Chesterfield College of Technology, Doncaster Technical College, Grimsby College of Further Education, North Lindsey Technical College and Rotherham College of Technology. The scheme will start in October.

TO ENCOURAGE YOUNG CHEMISTS to investigate and develop new analytical methods, the Midland section of the Society for Analytical Chemistry is organizing a competition. It will be for scientists who are under the age of 30, and who work in the Midlands. The competitor sending in the best paper on analytical chemistry will receive a trophy—a silver cigarette box—donated by Mr. W. T. Elwell, divisional analyst of Imperial Chemical Industries (Metals), Limited, Witton, Birmingham. From Wellingborough, Northants, comes news that a small fire at Morris Motors' foundry on July 4, destroyed 60 ft. of rubber conveyor belting contained in a ventilation duct.

AT THE INTERNATIONAL INDUSTRIAL FILM FESTIVAL held in Turin, in June, the United Steel Companies film "Steel Town" was placed first in its class. (A review of the film was published in the JOURNAL in the May 14 issue, page 556.)

In a case for damages brought by Mr. James Bingham, an instrument fitter, against Firth Brown Tools, Limited, Carlisle Street, Sheffield, Mr. Bingham said that in stepping to one side of a gangway his coat caught a 12-in. steel bar, causing dislodgement of this and another bar, and his right ankle was struck. He thought the protruding bars were dangerous. The labour manager for the firm, Mr. Keith Wainwright, said the minutes of the works safety committee revealed that no complaints about protruding bars had ever been registered. Judgment was given for the firm and Bingham ordered to pay costs.

A FOREWARNING is given by the National Association of Glove Manufacturers of an increase in the cost of leather goods, including industrial gloves, during the next few months. Apparently world prices of hides and calfskins have advanced up to 100 per cent. and more as compared with prices in July 1958, and for goat, sheep and other skins there has also been a considerable increase in price. The main causes are said to be the higher standard of living in many countries causing increased demand, heavy increases in purchases of hides and leather by Russia and satellite countries and Japan, and supplies from Argentina, America and other countries being greatly reduced.

A party of 12 French apprentices and two members of the staff from the Societe des Fonderies de Pont-a-Mousson (an ironworks at Nancy in France) visited the Stanton Ironworks Company, Limited, near Nottingham, on July 14. In the evening Stanton apprentices took the French visitors on a sightseeing tour of Nottingham, and afterwards, they were all entertained to dinner by the company. The Stanton boys visited the French works during a tour of France, Holland and Germany at the end of July. Further news from Stanton is that a new £4,000,000 iron-ore preparation plant is to be opened on October 1 by Mr. A. G. Stewart, chairman of Stewarts and Lloyds, Limited. More detailed information about the plant will be given in a future issue of the JOURNAL.

Institute of Metals

Autumn Meeting in Scandinavia

The 1959 autumn meeting of the Institute of Metals will be held in Sweden by invitation of Bolidens Gruv A.B., A.B. Svenska Metallverken and the Metallografska Institutet, with an extension to Denmark by invitation of the Danish Society of Metals. The meeting will open in Stockholm on Monday, September 21, and continue there until Friday, September 25. Those taking part in the visit to Denmark will leave for Copenhagen on the evening of the 25th.

Programme

A very attractive programme of technical sessions, works visits, ladies social outings, and social functions has been arranged. The technical sessions, to be held at Kungl. Teknisk Högskolan (Lecture Theatre), will commence with the autumn lecture to be given by Professor E. Rudberg, director of Metallografiska Institutet. At other sessions papers to be discussed will have the general themes of "Production of Fine Copper Wire for Enamelling" and "Corrosion of Aluminium" while sessions devoted to individual papers will deal with "Volume Increases in Fissile Materials on Neutron Irradiation and the Effects of Thermal Fluctuations" and "Extrusion in Comparison with other Methods for the Manufacture of Rod and Wire in Copper and Copper-base Alloys."

About fourteen works and research institutions are being opened for inspection including A.B. W. Dan Bergman (Wedaverken), Södertälje, manufacturers of aluminium and magnesium castings and pressure- and gravity-die castings; A.B. Atomenergi (research laboratories); laboratories of the Metallografska Institutet Teknisk and Kungl, Teknisk Högskolan; Aga (beacons, lighthouse equipment, stoves): A.B. Electrolux (vacuum cleaners, polishers, kitchen machines); A.B. Svenska Metallverken, Vasby (zinc and aluminium-alloy die-castings, hot pressings in brass; foil and injection mouldings); Stora Kopparbergs Bergslags A.B., Falun (copper mine and museum of mining), and Domnarfvets Jernwerk. Danish works visits include A/S Burmeister and Wain's Maskin og Skibsbyggeri (large diesel engines): and the Department of Metallurgy, Royal Technical University. During the visit to A.B. Atomenergi, at Studsvik, a technical session will be held at which the following papers will be presented and discussed:—"Swedish Research on Aluminium Reactor Technology," by Mr. Forsen, and "Welding of Aluminium for Reactor Use" by a member of A.B. Svenska Metallverken.

The social side has been well catered for by the inclusion of sightseeing tours, a cocktail party, banquet and dance, a Council dinner, and a visit to the Royal Palace and City Hall. For those going on to Denmark visits have been arranged to the National Museum, Kronborg Castle, the Royal Porcelain Factory, and other places of interest.

As it is impractical for a large number of people to travel to the meeting on the same day unless special arrangements are made, Thos. Cook & Son, Limited, have been appointed as the Institute's agents for travel, accommodation and certain essential services. A registration fee will be charged in the case of each member and guest registered for the meeting, and while it has not yet been possible to definitely assess this, it will probably be in the region of £12.

Dowlais Foundry Bi-centenary

Saturday, September 19, will mark the bi-centenary of the modern ingot-mould foundry at Dowlais, in Wales. Two hundred years before, to the day, articles of co-partnership in the original blast furnace were signed by nine partners, who had a capital of £4,000 (a real fortune in those days). The original plant was called the Myrthy Furnace," and the proprietors were committed to "joint dealing in the Art, Misterry, Occupation and Business of an Iron Master and Iron Manufacturer." The first plant manager was Mr. John Guest, who left his home town of Broseley, Shropshire—where he combined the unusual pursuits of farmer, ironfounder, brewer and coal dealer—to manage the new works in 1760. His family name is still linked with the owner company, Guest Keen Iron and Steel Company, Limited.

To-day, hematite-iron ingot moulds up to 30 tons in weight are made at the Dowlais foundry, along with grey-iron castings weighing up to 20 tons, and copper and copper-base alloy castings up to 2 tons. A £250,000 modernization scheme was completed in 1952, and the foundry now supplies all the ingot moulds for the company's steelworks in Cardiff, and more than half the moulds needed at the Port Talbot works of the Steel Company of Wales, Limited. The weekly capacity of the ingot-mould foundry is now 1,000 tons, and will increase considerably if shift working is adopted. To commemorate the bi-centenary the company has issued the "Dowlais Story" an illustrated record of the history and progress of the enterprise. Additionally, there was a visit to the works by members of the technical Press and, in particular, a tour of the new ingot-mould foundry which is to be described in the JOURNAL shortly.

New Creep Information Centre

In response to requests from manufacturers and users of high-temperature materials, a Creep Information Centre is being set up at the National Engineering Laboratory (formerly the Mechanical Engineering Research Laboratory) at East Kilbride, so that industrial designers can more readily obtain data on the strength of high-temperature materials. The main objective of the Centre will be to collect and tabulate all the available data on creep and rupture properties of conventional high-temperature materials. Data for British materials will be issued in an agreed form as far as considerations of commercial security allow. The scheme will later be extended to include fatigue and other mechanical properties of high-temperature materials and information about test procedures and testing machines: data on foreign materials may also be included. A leaflet giving further details of the scope of the Creep Information Centre is available from the Laboratory. All firms and research organizations concerned with the production or use of high-temperature engineering materials are invited to participate, and to write to the director, National Engineering Laboratory, East Kilbride, Glasgow.

AN ARTICLE on the lining of cupolas, appearing in the May issue of the *Journal d'Information Techniques des Industries de la Fonderie,* suggested that where monolithic linings are used a double layer of corrugated cardboard should be interposed between the lining and the furnace casing.

New Catalogues

Corrosion-resisting High-silicon Iron Alloys. In publication Sm/1/59, L. G. B., Bradley & Foster, Limited, Darlaston Iron Works, Darlaston, Staffs, detail a wealth of technical information on this very interesting series of high-silicon iron alloys. Actually this Hypersilid range covers three alloys with the silicon increasing from 11 to 17 per cent., and the carbon decreasing from 1.10 to 0.35 per cent. Details are given as to the preparation of the metal and a microstructure is reproduced, but, unfortunately, without the magnification being stated. Whilst compared with ordinary cast iron the Hypersilid alloys have less strength, they are much stronger than their main competitor, earthenware. The reviewer remembers Dr. Hurst, who has done much to develop this material, saying that if the material cooked like earthenware instead of cast iron, breakages would be enormously decreased. The uses of high-silicon iron alloy are set out in page 11 of the brochure and are much greater than the man-in-the-street would realize. The pattern contraction allowance for Hypersilid is $\frac{3}{16}$-in. per ft. Table 3, printed on page 17, gives the relative attack or lack of attack by a series of acids. The booklet concludes by recounting the requirements of these irons covered by British Standards specifications.

Steel Recuperators. R 59/12 E is the reference number of a 16-page catalogue issued by Metallurgical Engineers, Limited, 5-15, Cromer Street, London, W.C.1, covering heat-exchangers and heaters for air and gases. Of these there are numerous types with various metallurgical applications. The first two, the classical and channel recuperators, seem mainly to have heavy-duty or blast-furnace applications, where only slightly dusty gases are handled. The next one to be described is the flue-tube recuperator, which is designed for handling dust-containing gases and this is the type used in connection with the hot-blast cupola. Other types described and illustrated are radiation; combined radiation and convection; and combined concentric recuperators. The various systems described make an interesting comparative study of heat recuperation under diverse circumstances.

Silica Sands. A folder issued by British Industrial Sand, Limited, Holmethorpe, Redhill, Surrey, in an extensive table details the grade, type, chemical composition and sieve analyses of ten sands and the availability of these from three different quarries. With this folder came foundry data sheets 1 to 4, covering respectively the properties and applications of Redhill F and H and Lynn 4F and SS sands.

Resin-coated Sands. Feslente, Limited (a subsidiary company of British Industrial Sand, Limited), Holmethorpe, Redhill, Surrey, in *Technical Bulletin 6*, detail the properties obtained when using various grades of Redhill and Kings Lynn sands coated with resin for use in shell-moulding and -coremaking. In addition, optimum figures are given for a number of the factors involved in mould and coremaking.

Hard Pattern Plasters. Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7, in leaflet No. M9, give very full instructions for the mixing and use of Pattrex—the name given to a range of hard plasters for making patterns, patternplates, oddsides, models and coreboxes.

House Organs

Sirocco Record, Spring, 1959. Published for private circulation only by Davidson & Company, Limited, Sirocco Engineering Works, Belfast, Northern Ireland.

This is a well-produced magazine designed to be of interest to the company's staff; social events, however, are kept within bounds. The more important activities, such as the formation of new agencies and subsidiary companies, are well covered, and a comprehensive list detailing the composition of the company's staff at the various branches is included. The contents are well balanced and cover some historical notes, various developments in the shops, such as X-ray services and torsion-meter tests, and a description of the Sirocco foundry by Mr. V. C. Faulkner, extracted from the JOURNAL. Altogether this magazine is a pleasing publication.

Wiggin Nickel Alloys No. 51. Issued by Henry Wiggin & Company, Limited, Thames House, Millbank, London, S.W.1.

The issue features the use of nickel in the manufacture of a tank for the transportation of phenol by road, and a description is given of how AT nickel is used to protect the purity, and therefore the colour, of phenol. Also featured in this issue is the use of steel plates clad with nickel or Monel in the construction of heavy items of chemical plant. Other articles include the uses of nickel-containing materials in fast passenger launches; high-speed steam-cleaning units; and a review of high-temperature brazing equipment.

Die Casting News No. 2, published by the Zinc Alloy Die Casters' Association, 34, Berkeley Square, London, W.1.

This issue shows very clearly how machine-tools and other machines are now being built up from aggregations of zinc-alloy die-castings. Very impressive is the picture of the Selector Home-master Workshop, which mainly shows a portable electric drill and some gadgets for use with it. It carries 15 zinc-alloy castings weighing 11 lb. The whole is a very interesting and convincing bulletin.

Monsanto Mail, No. 3. Published by Monsanto Chemicals, Limited, 10-18, Victoria Street, London, S.W.1. This very-well-produced and brilliantly-illustrated magazine is designed to interest the general public and in this it is remarkably successful. For instance, an answer is given to those dissatisfied with the appearance of the rolling stock on British Railways. Other articles deal with ice cream, kitchen ware and so forth.

CORRESPONDENCE dated June 18 indicates that Dhingra Engineering Works, founders and engineers of 7/9, Luxman Bagh, Kanpur, India, are inviting tenders for the supply of tools and equipment including the following:—Pneumatic moulding machines of various sizes capable of moulding iron castings of up to 2 cwt. and jobs of diameters 24 to 36 in.; die-casting machines for parts of up to 14 lb. in weight; tilting furnace of 5 cwt. capacity; core-making machines; saw machine for steel; flexible grinding machine; coal-, coke- and oil-fired furnaces; die-steel casting equipment; electric furnaces with working temperatures of 1,600 deg. C. or more (various sizes and types) for steel melting and steel castings; electric furnace for heat-treatment; furnaces for malleable casting to be erected at site; air compressors and centrifugal casting machines and ancillary equipment. Interested parties should request details of requirements direct from the firm.

BF Apprentices' Competition

Fourteen apprentices from seven firms in London and the Home Counties recently took part in a competition run by the Association of Bronze & Brass Founders (London Area). The competition was held in order to stimulate the interest of apprentices generally and, in particular, to prepare candidates from the bronze and brass side of the foundry industry for the International Foundry Apprentices' Competition, which is to be held in this country next year.

pprentices' competition organized by the ABBF n Area) this year consisted of two separate parts ical and written. Each candidate was provided ntical pattern equipment and allowed to produce ing in the foundry of his employer. This casting de under the supervision of the management ed, who undertook that the work was carried the apprentice entirely unaided. The castings dged by an independent panel of three practical ymen and technicians at the Borough Poly- on April 22, 1959. The members of the panel Mr. Bicknall (foundry manager, Stanton Iron ; Mr. F. Hudson, F.I.M. (Mond Nickel Com- imited), and Mr. D. Morris (foundry manager, Armstrong). (See Fig. 1.) only was the competition a test of practical skill—including the ability to plan methods ulding, core-making, runisering and casting—it also d a three-hour written on technology, calculation, interpretation of technical s. This written examina- lso took place at the h Polytechnic, by kind per- of the principal, Dr. . Competitors were to use whichever yellow they favoured, and those ncluded aluminium-bronze, nsile brass, Admiralty gun- commercial gun-metal and phosphor-bronze. The age of each competitor was taken into account in judging the castings, and to arrive at the final results a ratio of 65 per cent. practical: 35 per cent. written was allocated.

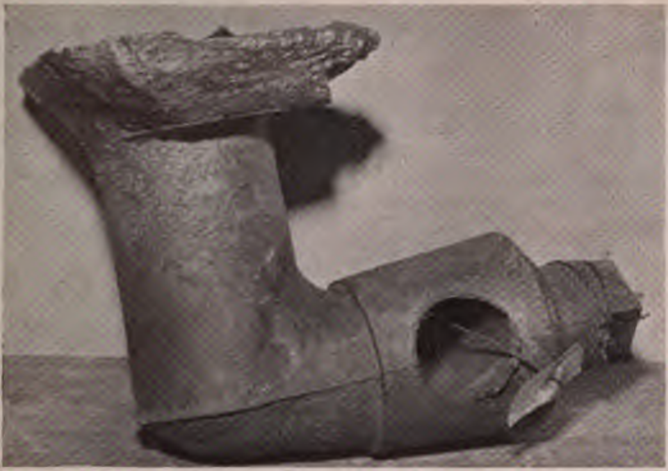
The results showed that most competitors were reasonably good in their practical work, but not well-advanced in their written papers. That being so, it was decided to introduce a low-mark limit on both practical and written tests, below which a competitor would not be eligible for a place. These limits were 60 per cent. for practical, and 35 per cent. for theoretical—the latter lamentably low, but necessary to enable the first three places to be filled. Although only three boys qualified for places in this competition it has been felt fair to award consolation prizes to two competitors—one with the second-best casting, the other having the second-best paper. Full results are given

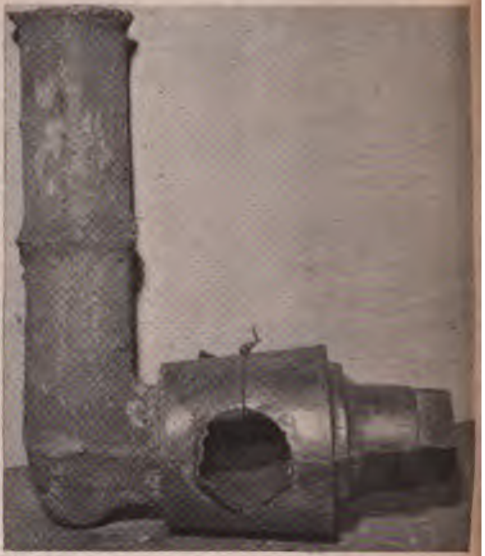
TABLE 1—*Prizewinners in the ABBF Apprentice Competition.*

Apprentice.	Practical results.			Written results.		Final mark (per cent.).	Position.
	Marks possible, 360.	Total percentage.	65 per cent. of total.	Total percentage.	35 per cent. of total.		
n (Langley Alloys, Ltd.)	231	64.1	41.66	80	28	69.66	1st.
bers ,, ,, ...	267	74.1	48.16	35	12.25	60.41	2nd.
ra (Anti-Attrition Metal Company, ...	238	66.1	42.9	47	16.45	59.35	3rd.
Consolation Prizes.							
t Written Paper:							
ooley (Hilger & Watts, Ltd.) ..	203	56.4	36.66	68	23.8	60.46	—
t Casting:							
dephatt (George Kent, Ltd.) ..	240	66.6	43.2	21	7.35	50.55	—

-In order to qualify for a place candidates had to obtain minimum marks as follows:—Practical: 60 per cent., written: 35 per cent.

.—*Organizers examining of the castings produced the ABBF local appren- competition, held in n; (from l. to r.) Mr. Buxton, Mr. F. Hudson, and Mr. D. Morris.*





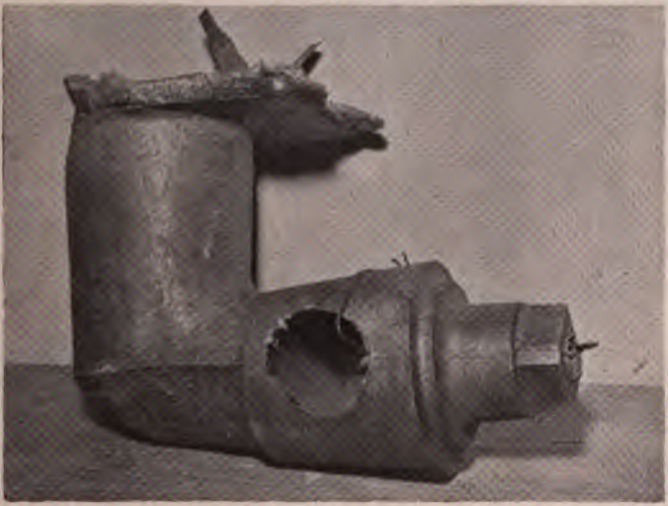


FIG. 2.—*Castings produced by the first three prizewinners during the ABBF competition; (left) casting made by P. Bonson (first prize)—weight* 44 *lb., metal BS* 1400 *AB*2; *(top left) K. Chambers (second prize) made this one, also in BS* 1400 *AB*2, *and (above) casting, weight* 34 *lb. in BS* 1400 *PB*1, *made by F. Ferreira (third prize).*

in Table 1, and Fig. 2 shows the castings submitted by the three winners.

Prizegiving

The prize distribution was held at the Clarendon Restaurant, Hammersmith, on Tuesday, June 24, and was preceded by a dinner to which all competitors were invited. The prizes consisted of a diploma and wristlet watch for first place, certificates and a copy of the book "Modern Foundry Practice" for second and third, and two consolation prizes of copies of "Modern Foundry Practice." In his address, Mr. W. R. Buxton (chairman of London-area ABBF members) said that if the British bronze- and brass-founding industry was to maintain its leadership in the engineering field it would require a large number of skilled craftsmen, who must continue to strive to produce high-quality goods. Although there was a lot of talk about automation, with its monotonous repetition, there was still a future for boys who were prepared to learn in the foundry and in the classroom how to tackle the problems facing the industry. Mr. Buxton then asked Mr. A. J. N. Brown (president of the Association) to present the prizes.

Mr. Brown, in presenting the prizes to the winners, said how pleased he was to see the gathering so well attended; and how encouraging it was that this first competition had had such support from the apprentices. It was a credit to Mr. Buxton that so many young men had entered, and he sincerely hoped that other areas would consider the idea as well. Mr. Brown then made the presentations.

Slides were shown of the winning castings, and Mr. F. Hudson, F.I.M., one of the judges, led a discussion on these, explaining the system of marking used and giving advice to competitors for future guidance. He detailed some of the difficulties which had faced the judges, and made some observations on various castings which had been produced. He explained that it was a special casting of an unorthodox design. Mr. Hudson went on to say that in a foundry there were always two types of moulder: the one who made anything he was given, and the one who considered the pattern which was submitted and, if he thought fit, asked for some modifications to be made to it to make founding easier, to ensure a better quality product. Mr. Hudson said that he was certain that those belonging to the latter type would have the more successful future in the industry. One question put to Mr. Hudson queried the use of different alloys by the competitors. It was explained that this ruling was made to enable apprentices to choose the alloy they knew best how to handle. The question of arranging competitions where only one metal would be used would be considered for the future.

The final speaker was Mr. A. R. French, who had set the written paper. He stressed how important theoretical work was, and how much he regretted that it had not been of a higher standard in this competition. He also stressed that, in the changing conditions of modern industrial life, it was essential that a good founder should "know all," and not only be a good moulder, but also know something about the drawings, patterns, sand, and metal—in fact, all aspects of a foundryman's life.

Acknowledgments

The ABBF members wish to express their thanks for the ready assistance given to them by the Institute of British Foundrymen (London branch), whose pattern equipment and rules were used; Dr. Garside and members of the staff of the mechanical engineering department of the Borough Polytechnic, for the use of their foundry and facilities for the written paper, and for the assistance given by Mr. Pyemont and Mr. Smellie. The Association also wish to thank the judges, and their companies for allowing them to give their time in this matter, and in addition, the Anti-Attrition Metal Company, Limited, and the Eyre Smelting Company, Limited, who subscribed the money to buy the prizes.

The success of this first essay of the ABBF into the world of competitions leads the members of the committee of the London area (Mr. W. R. Buxton, Mr. A. R. French, Colonel Holt and Mr. A. Talbot) to hope that other areas will continue the good work, and enable "British Bronze" boys to put this country where it belongs in international competitions, *i.e.*, at the forefront.

BISRA "Open Days"

The British Iron and Steel Research Association is planning two "open days" at their laboratories at Battersea Park Road, London, S.W.1, on October 22 and 23. The Battersea premises house the laboratories of the Association's plant-engineering and energy division, and the departments of physics, chemistry and operational research. Each of these departments will mount a display and visitors will be able to see some of the extensive work being done on electrical control and recording including, for example, the "Tallimarker" apparatus, one of the latest developments in information handling; testing of girder and gantry structures; a number of projects relating to the handling of bulk materials, and hydraulic and other control systems for steelworks plant, and displays relating to an enquiry into the fuel consumption of the industry. The metal-physics section will show something of the continuing investigations into the problem of combined creep and fatigue, whilst the chemistry department will be "highlighting" the work of its physical chemistry, corrosion and refractories sections.

Besides the Battersea premises, BSIRA's London group laboratories include part of the ironmaking division housed at the Imperial College of Science at South Kensington, and a special display of one of the most important projects of this division is being prepared to illustrate the principle of the recently-developed SCICE (stationary charge in controlled environment) apparatus.

Those wishing to attend the "open days" should make early application to the information officer of the Association at 11, Park Lane, London, W.1.

NEW BINDERS for Ciba (A.R.L.) Technical Notes are now available from Ciba (A.R.L.), Limited, Duxford, Cambridge, at a cost of 6s. 6d. each, post free.

Cast-iron Water Wheels

By C. J. Robb

The water-wheel was a feature of old-time rural industry, and before the introduction of cast-iron allied with wrought, the undershot wheel made principally of wood with radial floats provided the hydraulic motive power. In Ireland, bog fir was regarded as the best timber for the purpose, due to its centuries of seasoning in the bog.

First Developments

Back in 1759, Smeaton made the first radical improvements to the vertical wheel when he suggested the use of a cast-iron shaft with a hub flanch, to which the wooden arms could be bolted. This arrangement did not come into practical use until 1789, however. The flanch was then developed into a cast-iron hub proper, with sockets in the casting to take the arms fully housed-in—this made a much better wheel structurally. The shrouds and buckets continued to be made of wood, bolted together with iron straps. One of the first high-breast wheels was made by the Catharine Works in Ayrshire in 1825, with cast-iron shrouds in sections, cast hubs, and light cast-iron buckets. General Poncelet had also used castings in his multi-bucket undershot wheel at that period, and this hydraulic machine was widely used on the Continent.

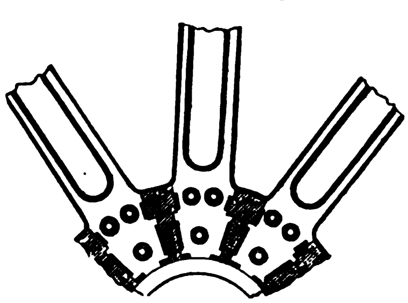


FIG. 1.—*Section of a water wheel which consisted entirely of cast-iron sections, made by John Rowan of Belfast in* 1830.

Cast-iron Water Wheel

In 1830, John Rowan, the Belfast ironfounder, made a water wheel (Fig. 1) entirely of cast-iron sections, including the arms, which were star-sectioned castings (hollow in the inside for two-thirds their length). The bolts alone were of wrought iron. All cast-wheels were considered more durable, as they did not decay or corrode, but they were heavy and required a good working head of water.

G. & J. WEIR, LIMITED, GLASGOW, and Chicago Bridge and Iron Company, USA, are setting up a jointly owned subsidiary company in the US to be known as Weir-Chicago Bridge, Inc. The new company will have as its objective the design, fabrication, and erection of saline-water conversion plants. The company will be utilizing the knowledge and experience of G. & J. Weir in the manufacture of large sea-water evaporation and distillation plants with the fabrication and construction facilities of Chicago Bridge.

Backlog

It is often said that "no news is good news" and similarly that "stale news is no news" and with the latter saying few would disagree. However, with the break in the diary of day-to-day events (normally reported in the Journal*) caused by the recent printing dispute, it is felt that circumstances warrant an attempt to fill the void and that this would be appreciated by readers. Hence, this condensed version of some of the personnel changes, promotions, etc., that have taken place in the intervening weeks, is intended to put readers "in the picture."*

Appointments, nominations, etc.

Recent appointments, nominations or elections to office include the appointment of Sir Kenneth Hague, M.I.MECH.E., M.I.E.E., deputy chairman of Babcock & Wilcox, Limited, as a part-time member of the Iron and Steel Board; the appointment of Mr. A. L. Louden to the board of Peglers, Limited, and that of Mr. Ronald Adamson as company secretary and comptroller of Joy-Sullivan, Limited, Greenock (Mr. R. A. Rust, whom Mr. Adamson succeeds, recently took over the post of general manager of the company's new air power division). The newly-elected president of the Forth Valley Chamber of Commerce is Mr. Richard H. Rowan, a dirctor of Smith & Wellstood, Limited, Bonnybridge. The appointment of Mr. C. M. Kramskoy to the board of E.M.I. Electronics, Limited, in the capacity of chief engineer (commercial) carries with it the responsibility of the company's commercial development. At Craven Brothers (Manchester), Limited, Mr. James Webb has been appointed secretary of the company. Following the acquisition of J. B. Brooks Industries, Limited, by Raleigh Industries, Limited, Mr. H. B. Yates, managing director of J. B. Brooks, has been appointed to the board of the latter concern. Mr. G. King becomes production control director and Mr. C. A. Jackson works director of Nottingham factories. The chairman and managing director of Wolf Electric Tools (Limited) is now Mr. Geoffrey M. Wolfe. Mr. H. Richards who has resigned as chairman remains on the board. Mr. J. L. Blackwood Murray has been appointed a director of Leyland Motors, Limited, and Sir Henry Spurrier, chairman and managing director of the company, has been re-elected chairman of the British Transport Vehicle Manufacturers Association. Mr. R. H. Foster has become a managing director of M. & W. Grazebrook, Limited. Mr. K. Seymour has been elected to the board of Thomas Glover & Company, Limited, a subsidiary of Glover & Main, Limited. On July 1, Dr. K. J. Irvine relinquished his duties as head of the metallurgy section of the research and development department of the United Steel Companies, Limited, to become deputy research manager. On the same date, Mr. J. D. Murray became head of a new section to be known as applied metallurgy, and Mr. F. B. Pickering became head of another new section on physical metallurgy.

The director of the metallurgical institute of the University of Rome has been elected president of the *Associazione Italiana di Metallurgia* (Italian association of metallurgy). On being appointed a director of English Steel Castings Corporation, Limited, English Steel Spring Corporation, Limited, and the Darlington Forge, Limited, Mr. A. M. Simmers relinquished the office of secretary to these companies. His successor in the latter capacity is Mr. P. H. Morwood. Mr. J. A. Dewhirst has been appointed managing director Midgley & Sutcliffe, Limited, one of the George Co 600 Group of companies. Mr. G. V. Palmer, who elected chairman of the Council of the Institute Export in June 1958, has been re-elected to the cha Two part-time members of the Merseyside and Nort Wales Electricity Board, Sir Geoffrey Summers, a director of John Summers, Limited, and Mr. Charles Morris Jones, have been re-appointed to the Board.

Appointments to the board of G. D. Peters & Company, Limited, include those of Lord Inverforth, Lord Teviot and Mr. H. J. Stretton as chairman, deputy chairman and managing director respectively. Mr. A. Dowie has relinquished his appointment as chairman of the company. Mr. W. W. Dolton has been elected president of the British Non-Ferrous Metals Federation in succession to Mr. John Grimston, M.P. Dr. M. Cook, Mr. W. F. Slater and Mr. Michael Clapham have been re-elected vice-presidents and Mr. C. H. M. Holden has also been elected a vice-president; another re-election is that of Mr. A. L. Johnson as treasurer.

This year's president of the Institute of Welding is Mr. E. Seymour Semper, managing director of Hancock & Company (Engineers), Limited. He is also this year's president of the British Acetylene Association. Further "welding" news is that Mr. A. A. Smith, B.SC., A.I.M., head of the welding processes section of the British Welding Research Association, has been temporarily seconded by the Association to the Department of Scientific and Industrial Research for attachment to the staff of the United Kingdom Scientific Mission in Washington, USA. His tour of duty in America will be of about 5 months duration from July 1, during which time he will be visiting manufacturers of welding equipment, fabricators who use the equipment, and some of the centres of scientific research in America which are interested in .welding.

The following have been appointed local directors of Marshall Sons & Company, Limited, Gainsborough:—Mr. J. P. Burton, Mr. G. H. Glover, Mr. C. A. Howe, Mr. T. W. Stainier and Mr. F. Walker. The London Midland Region of British Railways announces that Mr. G. B. Gray, M.A., M.INST.T., who has been acting divisional traffic manager for the East Midlands area since January, has now been appointed to that post, his headquarters being at Clumber Street, Nottingham; Mr. H. A. Mugliston has been appointed to a similar post for the Northern Division of British Railways (London Midland Region); his headquarters will be in Barrow. Mr. P. I. Mather has become secretary of James H. Dennis & Company, Limited, Cornelius Works, Widnes, Lancashire, in succession to Mr. Herbert Hutchinson, who has retired from that office and also from the board. Mr. Thomas Coughtrie, chairman and managing director of the Belmos Company, Limited, Bothwell, has been appointed a director of the North British Locomotive Company, Limited, Glasgow. Mr. C. R. Wheeler, who has been elected a director of Associated Electrical Industries, Limited, is joint managing director of the Guest Keen Iron and Steel Company, Limited, chairman of B.I.S.C. (Ore), Limited, and a director of Guest Keen & Nettlefolds, Limited, the British Iron and Steel Corporation, Limited, and a number of other companies. Mr. James Mitchell and executives of the company, Mr. W. O. C. Adamson, Mr. W. L. Cave, Mr. W. F. Gilbertson and Mr. G. L. Jones have been appointed to the board of Richard Thomas & Baldwins, Limited. Mr. Adamson had also been appointed general manager of the projected new steel works at Llanwern.

Mr. R. A. Weallans, technical manager of Burntisland Shipbuilding Company, Limited, has been elected a director of the company. Newly-appointed directors

ry Ford & Son, Limited, Cork, include Mr.
RENNAN, Mr. W. O'CONNELL and Mr. C. F. J.
-HARTE. Mr. BRENNAN has been appointed
ıg director as from September 1, and Mr. J.
became secretary on August 1. Mr. J. O'NEILL
l as a director and managing director with effect
ugust 3, but continues to serve the company
onsultative capacity. Mr. H. O'KANE elected,
rsonal reasons, to retire from his posts as
and secretary on July 31.

. C. AKESTER, managing director of Vent-Axia,
, has been appointed a director of the parent
y, Hall-Thermotank, Limited, and Mr. J. K. W.
R and Mr. S. J. JONES have been appointed to
rd of J. & E. Hall, Limited, a member of the
Mr. GEOFFREY W. BONE, a director of Ruston
nsby, Limited, has assumed responsibility for
npany's engineering policy and for that of its
e, Davey Paxman & Company, Limited. Mr.
ERGNE COUPLAND has been appointed an assis-
anaging director of Ruston & Hornsby. ING.
JOCH presented on June 18 at the Palace of
Warsaw, his doctorate thesis entitled: "Prob-
f High-strength Zinc Alloys Containing Manga-
nd Copper." Successors to two chairmanships
sly held by the late Sir ARCHIBALD J. BOYD are
. N. EDWARDS (Metropolitan-Cammell Carriage
'agon Company, Limited) and Mr. PHILIP B.
R (Patent Shaft & Axletree Company, Limited).
. D. TEASDALE, chief accountant of Fawcett
& Company, Metal Industries' engineering sub-
took over the additional post of secretary to the
ny on August 1.

ations and Retirements

ngst those who have resigned from the boards
ir companies during the past few weeks are
C. RILEY (Vauxhall Motors, Limited); Mr. C. M.
(Peglers, Limited); Mr. A. E. MORRISON (John
& Sons, Limited, Wolverhampton); and Mr.
MITCHELL (E.N.V. Engineering Company,
l). On reaching retirement age, Mr. ERNEST
relinquished his position as an executive
r of J. Brockhouse & Company, Limited, West
ich, at the end of June; Mr. W. G. HENDRY has
from the board of British Insulated Callender's
Limited. On medical advice, Mr. C. P. JONES
linquished his posts as director of the Rolls-
aero-engine division, and general manager of
mpany's Derby factories. He has now been
ed industrial relations adviser.

Scholarships in Advanced Photography

k. Limited, Department 106, Victoria Road,
, Middlesex, announces that the company is to
a number of scholarships annually to selected
s of photography who have already reached a
andard and who wish to devote a further year
-time work to an advanced course of study.
ards will be made in 1959 but in subsequent
he number may be increased up to 12. Awards
based mainly on the merit rating or marks
d in the following examinations:—(a) City and
of London Institute final examination in
raphy, and (b) Institute of British Photographers
diate examination. For the session 1959/1960
ccessful students will be enabled to attend a
e advanced course in photography at The
hnic, Regent Street, London. The awards will
ll course fees, the cost of approved text-books
cessary materials, and there will be a living
ce of £400 for the year payable in instalments
rm in advance.

Forty Years Ago

June 1919

The month of June 1919 was an important "milestone" in the history of the FOUNDRY TRADE JOURNAL for it was then that it removed from 165, the Strand, London, W.C.2, to Bessemer House, John Adam Street, Adelphi, London, W.C.2, the building which was its home until 1926 when the transfer to Wellington Street, Covent Garden was made. During the second world war, Bessemer House was bombed and on its site more than a decade later, the proprietors built John Adam House, the present home of the JOURNAL.

Editorially, in the June 1919 issue, it was announced that a Refractories Research Association had been formed with Dr. J. W. Mellor, F.R.S., as its director. There also was published an article on the "Use of X-rays applied to the Metallurgy of Steel," by Sir Robert Hadfield who had used this innovation for evaluating the worth of amorphous electrodes. Details are also given in the issue of a take-over bid by a large engineering concern for a slightly smaller concern, but to-day the parties involved are still quite separate companies. Amongst new companies registered appear the names of Metal Castings, Limited, and Robert Kellie & Son, Limited.

July 1919

The July 1919 issue of the JOURNAL reports on the competition British pig-iron makers were having from Alsace Lorraine. At that time there was an excess production of pig-iron due to the destruction of Belgian steelworks and those in Northern France, and inflation had carried the franc to 30 to the pound, so that export was easy. Moreover, the German mark was down to 4d. and reported as likely to depreciate further—which it most certainly did! Probably the first author to deal with the subject of producing grey-iron castings from the electric furnace was Mr. G. K. Elliott, and an abbreviated version of a paper he presented to the American Electrochemical Society in April 1919 was published in the issue under review. Mr. Elliott later repeated the lecture in 1921 to the Institute of British Foundrymen at a meeting held in Blackpool, and this was the first of a long series of papers to be exchanged between the two organizations. At that time, a number of trade unions were regrouping as the Amalgamated Society of Engineers. The foundry unions were not interested, but the United Patternmakers were approached and they eventually declined to join the ASE. Amongst new companies registered the following firms were listed:—General Gas Appliances, Limited; A. G. Spear, Limited; Vulcan Foundry (Walsall), Limited; and James Hogg & Sons (North Shields), Limited.

August 1919

At the Liverpool conference of the British Foundrymen's Association recorded in the August 1919 issue of the JOURNAL, Mr. John Little was elected president. The total membership of the Association was then 1,544 and an influx of about 500 was recorded during the year. Mr. (later Dr.) J. E. Hurst was appointed at the conference to represent the Association on the British Standards Associations Committee on Cast Iron. Later, at a special meeting, the Institute decided to apply for a Royal Charter and to have the name changed to the Institution of British Foundrymen—not Institute as was originally proposed.

Amongst new companies listed in the issue, the following names appeared: Diecastings, Limited; Robert Saunders (Castings), Limited; Dominion Machinery Company, Limited; Wellworthy, Limited (subsequently registered); Henry Gardner & Company, Limited; and Tube Investments, Limited.

Sandwich Courses

The Ministry of Education has published a "List of Sandwich Courses" through Her Majesty's Stationery Office, Kingsway, London, W.C.2, price 3s. 6d. net. In the list, the only foundry courses entering into this category are those offered by the Constantine Technical College, Middlesbrough, and the Bolton Technical College. To enter the courses at the latter College "satisfactory completion of the first two years of a national certificate course or the equivalent standard of full-time education at school" is required, and for the former, it is required that entrants must have the Intermediate City and Guilds diploma, or equivalent, in either patternmaking or foundry work.

For metallurgy a quite imposing list is given in the booklet, detailing sandwich courses in most of the large English cities. Scottish facilities are not included as education on the other side of the border is, of course, autonomous.

IBF National Works Visits Day

Preliminary information discloses that this year's National Works Visits Day, organized by the Institute of British Foundrymen, will be staged in the London area, with the IBF London branch as hosts. This is the day when parties drawn from the Institute's country-wide membership assemble in one area for a series of visits to local foundries—a very successful annual function inaugurated by Mr. R. B. Templeton when he was IBF national president. The date chosen for this year's function is Friday, October 30, and those intending to participate should make early reservation of hotel accommodation as the day comes within the Motor Show period, when London's popular hotels are heavily booked. As is usual at such functions, the day's visits will be followed by reassembly of the parties for dinner together in the evening, when light entertainment will be provided.

Radiation Hazard Investigation

It has been announced in Parliament that a panel of experts is being set up under the aegis of the Radioactive Substances Advisory Committee, with the following terms of reference:

> "To consider, in relation to persons working in research laboratories and research establishments (other than hospital research establishments), the safety and health questions arising from the use of ionizing radiations, and to report."

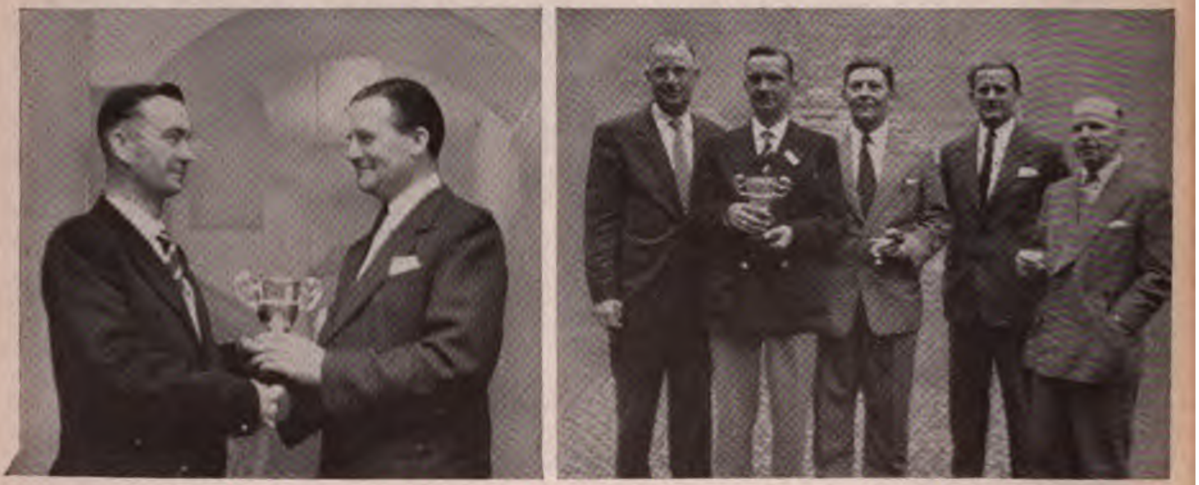
Professor B. W. Windeyer has agreed to serve as chairman of the panel, and other members of the panel will represent the universities, both sides of industry, Government departments and the nationalized industries. [Free industry is, in the Editor's opinion, too sparsely represented, whilst the committee is overloaded with the Government departments and the nationalized industries. Metropolitan-Vickers Electrical Company, Limited, and Stewarts and Lloyds, Limited, are the only two firms, representing free industry, whose names appear on the list—they are represented by Dr. C. W. Miller, and Mr. W. M. Larke.]

National Foundry College Visits

Students of the National Foundry College made their annual visit recently—to the South of England. The programme commenced on June 15 with a tour of the works of Langley Alloys, Limited, Langley, Bucks, and Anti-Attrition Metal Company, Limited, Maidenhead. On the next day K. & L. Steelfounders, Limited, Letchworth, and British Bath Company, Limited, Greenford, Middx, were visited, and on June 17, Le Grand Western Foundries, Limited, Southall, and Broom & Wade, Limited, High Wycombe. June 18 was taken up by visits to Ford Motor Company, Limited, Dagenham, and Lake & Elliot, Limited, Braintree, Essex, and the series concluded on June 19 with tours of Kent Alloys, Limited, Rochester, and A.P.V. Company, Limited, Crawley, Sussex.

Bradley & Foster Golf Winners

Prizewinners at the Bradley & Foster, Limited, golf competition (see JOURNAL, *page* 684 *of June* 11 *issue)—(left) Mr. H. W. Bonser receiving the McKenna Cup from Mr. Harmar Nicholls,* J.P., M.P.; *(right) Mr. L. Bramhall (second in the competition), Mr. Bonser (carrying the Cup) and Mr. R. J. Sherwood (third), with Mr. Harmar Nicholls and Mr. M. Froggatt (deputy managing director of Staveley Coal & Iron Company, Limited, with which firm Bradley & Foster are associated).*



H. Thursfield Presentation

cognition of his 23 years' association with the l and Midland Iron Founders' Association, H. Thursfield (who was a member of the com- of inception way back in 1936) was on June 4 d with a silver tea-service and cigarette box at mal presentation which followed a luncheon at ion Hotel, Dudley. Mr. Thursfield, a director s & Company, Limited, West Bromwich, of Foundry, Limited, Tipton, and also of Water-

n Founders, Eire, was elected vice-chairman of onal and Midland Iron Founders' Association and ten years later became chairman, which held until he retired this year. The illustration Mr. Thursfield (left) receiving the presentation e present chairman of the Association, Mr. W. (managing director of Monmer Foundry, Willenhall), with Mr. E. C. Marsland (centre).

uropean Mechanical Handling Federation

3th meeting in Paris of section IV (industrial of the *Federation Européenne de la Manuten-* ropean Mechanical Handling Federation) was by 50 delegates from 10 European countries, ritain being represented by six delegates; a tative of the USA truck industry was also as an observer. Work on standardization of for industrial trucks which had been mainly by the French group progressed to a point at nal agreement on many aspects is within sight. ish group presented a first draft of a proposed Code for Industrial Trucks" and after dis- it was agreed that a Code should be produced arts. The first being a manuafcturers' code of couched in technical terms for the use of of the Federation, the second part being a ode for circulation among users, to be based manufacturers' code of practice but in simpli- n, comprising nomenclature, stability factors, erformance, etc. This will be followed by a devoted to operating techniques, with a final which would give standard practices for main- ndustrial trucks. The British group have under- provide further material for discussion at the er meeting on section IV.

Institute of Vitreous Enamellers

Silver Jubilee Conference Exhibition

This year the Institute of Vitreous Enamellers celebrates its 25th anniversary and to mark the occasion a Silver Jubilee Conference and Exhibition is to be held at the Park Lane Hotel, Piccadilly, London, W.1, from September 14 to 19. Details of the programme are as follow:—

Monday, September 14.—Registration will commence in the afternoon, and in the evening there will be a reception, and the official opening of the conference and exhibition.

Tuesday, September 15.—Delegates will take part in one of the following works visits (*a*) Lafarge Aluminous Cement Company, Limited; or (*b*) R. & A. Main, Limited, and Belling & Company, Limited; or (*c*) R. & A. Main, Limited, and Benjamin Electric, Limited. For the ladies a tour of London has been arranged.

Wednesday, September 16.—Delegates will have a choice of two works visits—(*a*) British Bath Company, Limited, and Aladdin Industries, Limited, or (*b*) General Electric Company, Limited, and Frigidaire. Informal dinner/dance in the evening.

Thursday, September 17.—In the morning, following the annual general meeting, Professor A. I. Andrews will present the Mellor Memorial Lecture. Papers to be presented at the technical session in the afternoon include "Fundamentals of Gas Evolution from Vitreous Enamelling," by Mr. G. P. K. Chu; "Blistering of Wet Process Vitreous Enamels on Cast Iron—Some Facts and Theories," by Mr. E. R. Evans and Mr. A. D. Morgan; and "Pinholes and Porosity in Castings for Vitreous Enamelling," by Mr. C. A. Sanders. An excursion to Windsor and the Thames Valley has been arranged for the ladies.

Friday, September 18.—The morning session will comprise three papers (1) "Control of Furnace Temperatures," by Mr. W. J. Swinn; (2) Correct Use of Fuel-oil and Burning Equipment," by Mr. G. O. Fenner and (3) "Refractories," by Mr. D. Dixon. In the afternoon the papers will be "Modern Methods of Decoration," by Dr. W. L. German; "Critical Assessment of Vitreous Enamel for Domestic Purposes," by Miss Whalley, and "Effects of Detergents," a subcommittee report. Ladies will attend a floral arrangement demonstration. The annual banquet takes place in the evening.

Saturday, September 19.—The final technical session, when Mr. F. Rickman will present a paper and film on "Interface Phenomena in Enamels."

The conference fees are £14 for members and £13 for ladies, and those intending to participate should make application as soon as possible to Mr. John D. Gardom, secretary of the Institute of Vitreous Enamellers, Ripley, near Derby.

Stal

The Iron and Steel Institute (4, Grosvenor Gardens, London, S.W.1) are translating into English the whole contents of the Russian magazine *Stal* (Steel) and publishing this version monthly. The first issue was made available in June, the contents of which at least are interesting and comprehensive, covering as they do ironmaking, steelmaking, electric-furnace practice, rolling and tube production and heat-treatment. The magazine costs £20 12s. a year; a price reduced to £15 12s. to members of the Institute (post free in both cases). Single copies are £12 1s. and £1 11s. in the cases indicated.

Notes from the Branches

Northampton Section

At the annual general meeting of the Northampton and district section of the Institute of British Foundrymen held in April at the Plough Hotel, Northampton, Mr. H. Edge was elected president for the ensuing year, Mr. R. Jelley, senior vice-president, and Mr. A. Tipper, junior vice-president. Mr. W. D. Ford was re-elected secretary and the new members elected to the Council were Mr. Hope, Mr. Hodgkiss and Mr. Mason. It was reported that the attendance at meetings continues to grow and that the number of new members who had joined during the last year had increased three fold. This particular point was later brought out by Mr. W. J. Wood, who voiced the opinion of the members present in congratulating Mr. J. T. Stevens, the retiring president, on obtaining so many new members during his year of office.

Following the business of the meeting Mr. H. Pinchin, manager of the Stanton Ironworks Company's Erewash Foundry, presented a paper entitled "Some Practical Experiences in making Moulds in a Mechanized Foundry."

The Stanton foundry produces large castings such as tunnel segments, siphon boxes, manhole covers and frames and a great variety of large pipe specials in considerable quantities. Sandslingers are used throughout to ram 100 tons of sand per hour and the system of moulding instituted by Mr. Pinchin enabled an easy changeover of jobs and new ones to be introduced on a standard system of box construction, ramming speeds and coremaking.

The author explained the importance of close attention to cup and liner clearances in the slinger head to maintain ramming density, and said that where a more permeable mould was required the best practice was to change the slinger head to one of smaller diameter instead of setting back the cup. He also emphasized the importance of shaping boxes and bars so as to provide as near as practicable a uniform gap between the pattern and box in which to ram. The path the slinger head should follow when ramming the mould was shown on a number of excellent slides, and a film of the sand stream leaving the slinger head, using three different cup to liner clearances, was most revealing.

In the foundry, Mr. Pinchin said, nearly all the cores were made from green-sand, and in the case of pipe specials and castings which have to be pressure tested, the use of chaplets was avoided by using very strong core irons carried through to the outside of the box parts for support and for wedging to prevent the cores from turning during casting. These cores were also made on slingers by ramming into the bottom half of the corebox, with a light frame taking the place of the top-half corebox and shaped so as to give 2 per cent. excess sand in the core. With this top frame removed and the core carried in the bottom half, it was put under a press which carried the top half. It was only at this point that the two halves of the corebox met to squeeze the oversize core to its correct shape and diameter. The use of a naturally-bonded sand Mr. Pinchin said made it of paramount importance to keep the permeability at AFA No. 100 and to do this it was necessary to pass all knockout sand through two coolers and desilters. A small amount of coarse sand (one per cent.) was added in bulk, and as any oil-sand cores which were used went into the moulding-sand system, this core-sand was kept as coarse as casting finish permitted.

The photograph below shows the party of members of the Wales & Monmouth branch of the Institute of British Foundrymen who recently visited the works of Dialoy, Limited, Cardiff. Departments visited included die-designing and manufacture; die- and sand-casting; shell-core production and the finishing shops. At the conclusion of the tour a vote of thanks was proposed by Mr. A. S. Wall, branch secretary, and seconded by Mr. Gordon Jones; Mr. L. G. Duddridge, works director of Dialoy, responded.

quipment and Supplies

·il-Plycast Process

e Investril-Plycast process (inquiries to Investril
& Metallurgical Services, Limited, 164, Walsall
Four Oaks, Sutton Coldfield), a shell is pro-
over a wax pattern by a dipping technique.
processes are already familiar in the invest-
ısting industry but it is claimed that Investril-
differs from them in that costs are much
:here is a more rapid cycle of production, and
king of the moulds can be done mechanically
FC range of mould-making machines.
mould is built up of refractory material to a
ꜱs of between ¼ to ⅜ in. When ready to be
is highly porous, requires no external support
casting, and is claimed to withstand ferro-
ressures very well. Castings up to 33 lb. in
have been cast into unsupported moulds. An
mate material cost for the average mould is
ɔd., and by simple manual methods it can be
n about 15 min. In mechanized installations
ıe can be reduced considerably by carrying the
ready for dipping, to a mould ready for
ıg.
dewaxing, shells may be stored indefinitely.
ing prior to casting may be rapid, and can be
:ed in 70 min. A major advantage is rapid
form dissipation of heat, and close packing of
terns is not essential. The method is claimed
uitable for a wide variety of steels, as well as
ypes of materials. By nature of the mould
ɛ, variations from casting to casting are small,
ɛct rates low.

nelt and Demag tie-up with G.W.B.

B. Furnaces, Limited, Dibdale Works, Dudley,
announce that they have concluded agreements
co-operative manufacture and sale, in Great
and most of the Commonwealth countries, of
ɔle range of melting plant designed by Demag-
netallurgie GmbH, of Duisburg, Germany, and
ıelt Furnace Division, McGraw-Edison Com-
Pittsburgh, USA. The total installed capacity
ıag and Lectromelt arc-melting furnaces repre-
750,000 kva, corresponding to 2,800 installa-
This agreement enables G.W.B. to offer arc
with a capacity of up to 200 tons, with or
rotating shell and alternative electrode control
these being static- or rotating-magnetic-
r type or hydraulic.
dition, the agreement with Demag covers sub-
arc furnaces for the reduction of ores and
ion of ferro-alloys and calcium carbide. In
e of equipment total connected loads exceed
kva. The field of induction-melting furnaces
well covered, enabling G.W.B. to offer Demag-
l crucible-type units for mains-frequency or
lternator operation for steels, irons and non-
metals. Channel-type mains-frequency induc-
naces may also be supplied for melting light
copper and copper alloys, zinc and irons.

ɔcouple Wire

iniature thermocouple-wire, with an outside
r of only 0.5 mm., is the latest addition to the
coax range of ceramic-packed thermocouple-
istributed in the UK by Research and Control
ents, Limited, Instrument House, 207, King's
oad, London, W.C.1. Known as the Thermo-
\B Ac 05, the wire has an outer sheath of
ɛel, and cores of Chromel/Alumel (trade mark of Hoskins Manufacturing Company) insulated from each other and the sheath by powdered magnesium-oxide.

Temperature range is stated to be 0 to 900 deg. C., and an accuracy of 2.8 deg. C. up to 350 deg. C., and of 0.75 per cent. from 350 to 1,000 deg. C. is claimed together with good stability, short response time, high mechanical strength, and good electrical insulation. The wire may be bent on a radius of 1 mm. A new 1-mm. Thermocoax, with Inconel sheathing, is also available, with greater resistance to corrosion than the standard 18/8 steel-sheath type. Another innovation is a box of accessories for facilitating the correct forming of thermocouples, and for protecting the couple itself against corrosion.

Electronic Controls

A mobile exhibition unit from Lancashire Dynamo Electronic Products, Limited, of Rugeley, Staffs, recently visited London, and was sited in the forecourt of the Festival Hall. Amongst equipment displayed of interest to foundrymen was a smoke densometer (Smoke Alarm Series SME. 2) which ensured compliance with the Clean Air Act. This warning device consisted essentially of a regulated light source, on one side of a smoke stack, which was directed at a photocell on the other. It is claimed that this is the only unit at present bearing the British Standards Institution's "Kite" mark.

Another interesting device exhibited was one which could be set to automatically control the lighting system of a large factory, switching on in the morning and off at night from Monday to Friday, or during the whole week if required. Also demonstrated were a range of the usual photo-electric switches, operating by interruption or partial obscuration of a light source.

BAKELITE, LIMITED, 12-18, Grosvenor Gardens, London, S.W.1, have introduced three hardeners—DQ.19121, DQ.19127 and DQ.19128—which are designed for use with standard Bakelite liquid epoxide resin R.18774/1. It is claimed that these hardeners, which are anhydrides, give long working life and low viscosity suitable for use in casting, potting, laminating and impregnating applications. At elevated temperatures, the systems harden with little shrinkage and low exotherm to give products with good mechanical and electrical properties.

FOUNDRY SUPPLIERS, LIMITED, 25a, Cockspur Street, London, S.W.1, announce that they have been appointed the sole agent within the foundry industry in England and Wales for a fuel-oil improver and sulphur inhibitor known as Desulfurol. The use of this material, it is claimed, can bring about substantial reduction in sulphur contamination of molten metal, where this is in direct contact with the flame from sulphur-bearing fuels; also it eliminates the menace of sulphur fumes.

WALKER, CROSWELLER & COMPANY, LIMITED, Cheltenham, have extended their range of Arkon variable-flow indicators. These instruments may be adjusted for high or low velocities of flow, and now include sizes 1¼, 1½ and 2 in., in addition to the previous sizes of up to 1 in.

A TRIAL OFFER of the full range of Surform hand-tools is being made by the manufacturers, Simmonds Aerocessories, Limited, Treforest, Glamorgan (a member of the Firth Cleveland group). The scheme applies to all Surform tools and will be in operation until the end of this month.

American Letter

Evaluation of Cast Mg/Th/Zr Alloy HK31A*

This article is based on testing and evaluation of castings made from the magnesium alloy designated HK31A (chemical composition: Th 2.5 to 4 per cent., Zr 0.5 to 1.0 per cent., Mg remainder). Thorium, with an atomic weight of 232 and a density of 11.5, is more opaque to X-rays than magnesium (atomic weight 24, density of 1.74). Zirconium (atomic weight 91, density 6.5) is also more opaque than magnesium—the absorption coefficient of X-rays increases with the atomic number of the absorbing atoms, the number of atoms per unit volume, and the X-ray wavelength. As a result, portions of a casting that contain a higher than normal concentration of thorium or zirconium will absorb greater amounts of radiation, and will appear as light areas on X-ray films. These areas are excellent evidence of macrosegregation in the castings. An evaluation of the effect of this segregation on the mechanical properties of the cast material was made.

Test Method

Several castings were selected, on the basis of X-ray indications, to be cut into tensile specimens representative of the segregation conditions. These specimens were tensile-tested at room temperature, and at 260 deg. C. Autoradiographs, radiographs, micrographs and spectrographs were made of the specimens to investigate variations in composition and associated effects. It was affirmed that the X-ray indications were caused by segregation, and that the segregation had a definite effect on the microstructure. It was possible, using radiographic, spectrographic and metallographic examination, to determine with fair certainty that a compositional variation is responsible for the effects observed.

Deficiency Condition

An examination of the data indicated that the deficiency condition did not affect the room-temperature mechanical properties of the material. Testing at 260 deg. C., however, showed that the deficiency condition definitely promoted failure. The data showed that this condition reduced average ultimate tensile strength by about 8 per cent., and per cent. elongation by about 24 per cent. This reduction is to be expected, considering that thorium is added to impart high-temperature strength. The coarse grain-size observed in association with deficient regions is believed to be significant in contributing to the loss of ductility and ultimate strength.

Heavy Segregation

Room-temperature testing of specimens with heavy segregation showed an average loss in ultimate tensile strength of 15 per cent., and a loss in per cent. elongation of 37 per cent. The average 260 deg. C. ultimate tensile strength, and per cent. elongation, values were found to be 7, and 58 per cent. respectively lower than observed in the normal samples. Regions deficient in alloying elements had reduced elevated-temperature mechanical properties, but had normal room-temperature properties.

Additional Inspection Requirement

Certain critically stressed regions of the castings are required to have the following room-temperature mechanical properties: 12.04 tons per sq. in. minimum ultimate tensile strength, 5.80 tons per sq. in. minimum yield strength at 0.2 per cent. offset, and 4 per cent. minimum elongation. These regions are also required to have properties of 8.47 tons per sq. in. minimum ultimate tensile strength, and 4.77 tons per sq. in. minimum yield strength, when tested at 260 deg. C. In order to be relatively certain that these castings would perform to expectation, it was deemed necessary to add an additional inspection requirement to the already thorough inspection procedure. This requirement is that critically stressed regions must not exhibit segregation or deficiency in excess of that illustrated in three X-ray standard film blocks. Although these standards do not cover all eventualities, they will be used until replaced or supplemented.

Improvements Needed

The extensive use of castings for missile structure application will depend on the foundry industry progressing to where it can offer the missile designer the following advantages:

(1) Guaranteed strength and ductility *in the casting*. (Separately-cast test-bar values will not be acceptable.)

(2) Maximum consistency and reliability throughout any batch of castings and accurate chemical composition analyses.

(3) Castings designed on the basis of the ultimate in wrought properties.

(4) Increased dimensional accuracy, permitting the maximum use of as-cast surfaces.

(5) Specifically-formulated casting alloys to compete with the wrought superalloys.

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[*] From work done by T. R. Bergstrom and R. G. Bassett, who are associate research engineer, and research engineer, *respectively* in the materials unit, pilotless aircraft division, *Boeing Airplane Company, Seattle*, Washington.

One-week Course on S.-g. Iron

A one-week course on s.-g. iron technology was held from June 29 to July 3 at New York University. It consisted of 25 lectures and discussions on the latest developments in the field. Informal evening discussions were also held. D. J. Reese (director, ductile-iron division, International Nickel Company) delivered the opening address. Prominent among the speakers were three internationally known European experts: H. Morrogh (British Cast Iron Research Association), W. W. Braidwood (Mond Nickel Company, Birmingham, England) and Dr. E. Mortara (Caster, Bologna, Italy).

A list of speakers and their subjects is given below.

Rointan F. Bunshah (NYU) "Iron-Carbon Diagram and Steels"; John P. Nielsen (NYU) "Cast Irons and Malleable Irons"; K. D. Millis (International Nickel Company) "Metallurgy of Magnesium-containing Iron"; H. Morrogh (British Cast Iron Research Association) "Theoretical Considerations of Spheroidal Graphite Formation"; R. A. Flinn (University of Michigan) "Engineering Properties of Ductile Iron"; C. R. Isleib (Inco) "Mechanical Properties of Ductile Iron"; J. L. Salbaing (Inco) "Machinability and Welding Characteristics."

Howard F. Taylor (Massachusetts Institute of Technology) "Effect of Alloying on Properties and Matrix Structures"; Charles C. Reynolds (Dartmouth College) "Effect of Heat Treatment on Properties and Structure"; W. W. Braidwood (Mond Nickel Company) "Melting Methods and Procedures"; R. W. White (Inco) "Methods of Magnesium Treatment and Inoculation"; a representative (Morris Bean & Company) "Precision Moulding of Ductile Iron"; A. A. Adams (Ford Motor Company) "Quality Control and Testing" Harry W. McQuaid, consultant, "Hot Working of Ductile Iron"; J. L. Salbaing (Inco) "Designing for Ductile Iron."

H. W. Northrup (Inco) "Specifications and Codes"; W. D. McMillan (International Harvester Company) "Applications in Farm Equipment"; K. H. Kurgin (Inco) "Applications in Fluid Handling Equipment"; Garrett D. Orr (Hodge Foundry Company) "Applications in Steel Mill Maintenance"; W. H. Dawson (Inco) "Applications in the Automotive Industry"; E. Mortara, Bologna, Italy, "Applications in Europe, Africa, and the Far East," and F. G. Sefing (Inco) "Properties and Applications of Ductile Ni-Resist."

BCIRA Open Day

than 250 visitors, including many foundry- ere present on May 28 at the first Open Day British Cast Iron Research Association, at ley Hall, Alvechurch, Birmingham. In the below the president, Mr. E. Player, C.B.E. *chairman and managing director of Birmid ies, Limited) is shown inaugurating the new ental cupola installation, which was de- in detail in the May 28 issue of the* JOURNAL.

The second illustration (above) shows Dr. J. G. Pearce, C.B.E. *(a former director of the BCIRA), formally declaring open the new foundry-atmospheres laboratory, which has been established at a cost of £25,000. Mr. G. R. Woodward (manager, BCIRA Intelligence Department) at the opening ceremony, stressed the urgency of better fume and dust control, in order to meet the requirements of the Clean Air Act. In this picture Dr. Pearce is accompanied by Mr. H. Morrogh, the present director.*

New Sales Policy

-fuel-fired domestic heating and cooking ap- is not the easiest equipment to sell, and with mind, Allied Ironfounders, of 28, Brook Street, W.1, have launched two special experiments— they hope may revolutionize the selling and of these commodities—in association with merchants. The new types of service, fore- ed by these experiments, include expert in the customer's own home, before he chooses; le, comprehensive hire-purchase agreement which all the equipment and all builder's and installation costs can be covered by a monthly payment; and after-sales service. It licy which is much to be commended.

French Business Information

The Board of Trade from their Export Services Branch, Lacon House, Theobalds Road, London, W.C.1, have issued two excellent reports—"Representation in France" (reference GEN/5010) and "Forming a Company in France" (reference GEN/5011). They contain extremely valuable information, although it is not every day that a firm has either of these needs. In both cases it seems that the advice of a Parisian legal house is a prerequisite and a list of British qualified practitioners is given. It should be borne in mind that in matters of this kind the Board of Trade is always ready to give assistance.

All enquiries for such assistance should be sent to the Board of Trade at the address quoted above.

Company Meeting

The Wolverhampton Metal Company

STRONG FINANCIAL POSITION

Mr. Thomas C. James on Efforts to Increase Efficiency

The 56th annual general meeting of The Wolverhampton Metal Company, Limited, was held on July 28 in Birmingham, Mr. James H. Furnival (Vice-Chairman and Joint Managing Director) presiding in the unavoidable absence through indisposition of Mr. Thomas C. James (Chairman and Joint Managing Director).

The following is an extract from the Chairman's circulated statement:—

The severe conditions referred to in my last report have continued and intensified. In these circumstances I think that you will agree that the results for the year ended March 31, 1959, are satisfactory. Group Profits at £470,215 before taxation compare with £507,119 in the previous year.

In spite of the shortage of raw materials, we increased production at Wednesfield (Ingot Metals) and James Bridge (Cathode Copper, etc.), but factors affecting our margins adversely were:—Excess of productive capacity in the industry over the demand for the products, particularly in relation to alloys, resulting in serious price competition; keen competition for the available raw materials and the fall in the level of export prices affecting all producers of ingot metal; business, which had been reasonably profitable in some cases, became uneconomic. To meet this situation we have been striving, by improving our processing techniques, to reduce costs of production.

Full advantage has been taken of the latest technical developments in the industry including improved laboratory methods. To cope with the much stricter specifications now being developed by the British Standards Committee, we have re-equipped our Laboratories with the latest instruments, enabling us to deal with the increased demand for analysis and control and easing the burden on the members of our laboratory staff.

The Accounts

I referred in my Statement last year to our Capital Expenditure programme, designed to increase efficiency of production and widen the scope of our activities. During the year under review £112,535 was spent under this heading. Current Assets at £2,027,392 exceed Current Liabilities at £613,921 by £1,413,471.

After providing £80,784 for depreciation our Group Profit is £470,215. Taxation assessable thereon is £215,915. A result of the reduction in the level of taxation is that our distribution profit exceeds that of last year by £15,159, although the trading profit before taxation is less than in the preceding year by £36,904.

The Board has given careful consideration to the question of dividend. The available profit is some £15,000 higher and the Group has substantial reserves and ample cash resources. At the same time the prospects for the current year are that at present, an increase in profits cannot be anticipated. In these circumstances the Board has decided to recommend that the final dividend be maintained at 17½ per cent., less Income Tax, making a total of 27½ per cent. less Income Tax for the year. In view of our strong position, however, it has been decided to recommend in addition a special bonus of 5 per cent., less Income Tax.

Future Outlook

Current trading conditions indicate that for the time being we shall have to continue to face highly competitive conditions similar to those of the year just ended. In spite of the uncertainty of the metal market and the reluctance of buyers to place orders for forward sales, our order-book continues to be satisfactory.

To maintain our position in the forefront of the industry considerable further capital expenditure will be necessary for buildings, plant, machinery, and equipment. Our technical strength and financial resources will enable us to meet the present-day conditions and we shall be well equipped to take advantage of any improvement in trade which may eventually arise.

The report and accounts were adopted.

Latest Foundry Statistics

Steel Castings: Employment in the steelfoundries suffered a slight reduction during the period March 7 to April 4. The British Iron and Steel Federation and the Iron and Steel Board in their joint *Bulletin* for May report that when a count was taken on April 4, 17,430 were employed, or 110 fewer than on March 7. The provisional figures for the average weekly output of steel castings during April was 5,000 tons, which is much better than the low figure of 4,700 tons returned, again provisionally, for March.

Copper-base Alloys: An improvement in the production of copper-base castings was reported by the British Bureau of Non-Ferrous Metal Statistics for the first four months of the year, when output was 25,152 tons as against 25,246 tons for the corresponding period in 1958. Production in April was 7,205 tons, a distinct improvement over the monthly average. However, for May the Bureau reports that output of these castings was only 5,818 tons—a fairly low average.

Light Alloys: Very belatedly (July 7) the Ministry of Supply published the production figures for the light alloys for the month of March. From them it is learnt that 1,445 tons of aluminium castings were made from sand moulds; 3,801 tons of gravity-die castings and 1,593 tons of pressure-die castings were produced. The output of magnesium-alloy castings was 145 tons. Production of these castings in April was 1,636 tons; 4,214 tons and 1,831 tons respectively, whilst output of magnesium castings was 163 tons.

Ironfounding: The Council of Ironfoundry Associations states that of the 123,446 workers employed in ironfounding during the week ending May 30, 114,963 were males and 8,483 females. The increase over the May 2 figures was four, made up of a decrease of three men and a gain of seven women.

FOR SEVERAL WEEKS PAST, one of the principal display windows at the New South Wales Government's offices in the Strand, London, has been devoted to publicising a foundry supply firm. Presumably as an indication of the growing industrial potential of the area, the exhibit is set out to draw attention to the establishment by Foundry Services Australia Pty., Limited, of substantial manufacturing premises at Padstow, New South Wales.

News in Brief

HARDS & SONS, LIMITED, has plans to enlarge
s at Britannia Foundry, North Ormesby Road,
rough, Yorks. Adjoining premises have been
for this purpose.

LAND TECHNICAL COLLEGE will be opened on
r 4, by Sir Alexander Fleck, chairman of
Chemical Industries, Limited, according to a
t issued by the North Riding Education Com-

V. P. MULLEN, general manager, Chamberlain
imited, manufacturers of cranes, excavators,
wn Works, Enfield, Middlesex, who has been
siness trip to European and Mediterranean
, recently returned to the UK.

INISTRY OF SUPPLY has placed an order for
n-tank gearboxes, worth £110,000, with David
ndustries, Limited. The units will be manu-
by the David Brown automobile-gear and
divisions at Park Works, Huddersfield.

ERS BROS., LIMITED, ganister manufacturers,
treet, Sheffield, have received an order for
s of ladle-lining refractories material for a
s in the north of Sweden, in the Arctic circle.
shipment went by barge to Goole in June.

ON, CHAMBERS & COMPANY, LIMITED, of Thorn-
ar Sheffield, have developed a fully-automatic
boiler (Centramatic 80), which incorporates a
of burner. This burner is a fan-pressurized
rporating electric ignition and a co-axial type

GINEERING MATERIALS AND DESIGN exhibition
erence is to be held next year, from February
at Earls Court, London. Engineering materials
clude minerals, plastics, textiles, rubber, refrac-
eramics, etc., and at the exhibition, the first
nd in this country, a most varied selection of
d other materials will be displayed.

ATED FOUNDRIES, LIMITED, have placed an
th Baker Perkins, Limited, of Bedewell Works,
-on-Tyne, for the supply of a Taccone dia-
moulding machine. The machine, which will
7,000, will be capable of squeezing simul-
y two moulding boxes 84 by 36 by 12-in. deep.
eeze time for one complete mould will be
ds. It is believed that the machine will be one
argest sand-moulding machines in the world.

V. A. MACFARLANE, managing director of the
Industrial Fuel Efficiency Service, addressing
g of Sheffield industrialists, said that industry
entered a period when cost, productivity and
of output were far more important than in the
a sellers' market. For this reason the NIFES
20 per cent. more calls for advice last year.
years of its existence more than half of the
major consumers—3,500 out of 6,900—had
n its services.

SUCCESS OF A NEW INDUSTRY which it helped
lish in the Philippines last year has netted a
arter million dollar repeat order for a Rochdale
ing and consultant firm. The order has been
with Thomas Robinson and Son, Limited, by
Flour Mills Incorporated, the Manila Com-
r which Robinson's established the first flour
he Philippines. It calls for the setting up of a
mill to increase the output of flour from
b. per hour to over 31,000 lb. per hour. A
actor in the placing of the contract was the
ld of service which the Rochdale company
e to offer.

LORD NORTHESK, recently, unveiled at the works of the British Rolling Mills, Limited, Tipton, a plaque commemorating the fact that the factory stands on the site of the historic Bloomfield Ironworks where the first commercial beam engine, designed by James Watt, was installed in 1776. Mr. J. Francis Parker, a director of British Rolling Mills, discovered that the historic link existed when he read a biography of James Watt. After consulting the Newcomen Society he decided on the erection of an appropriate memorial. Mr. Parker's father—another Mr. J. F. Parker—presided at the unveiling ceremony. Mr. Parker, senior, is a Fellow of the Society of Antiquaries.

TO ASSIST in the training of technicians, Evershed & Vignoles, Limited, Acton Lane Works, Chiswick, London, W.4, have made available certain of their industrial instruments in specially adapted form to enable the operational functions and details of construction and maintenance to be studied. The instrument mechanisms are exactly similar to those supplied for industrial applications—but the provision of transparent windows and other facilities make the units ideally suited for training purposes. The three main types available are a model Servo Mechanism; a process controller and simulator, and Megger testing sets for insulation, continuity and earth-testing procedures.

TO COMMEMORATE ITS 150TH ANNIVERSARY, on June 1, employees of the Smethwick firm of Evered & Company, Limited, were granted a bonus based on years of service up to a maximum of £25, and pensioners were given a 15 per cent. increase in their pensions. On May 28, the Mayor and Corporation of Smethwick were entertained at the factory and an exhibition of the company's products was staged for the visitors. In July, employees' families made a tour of the works where the firm has been in production for 93 years. The company was founded in Drury Lane, London, by Richard Evered. Mr. Ernest Miller, a 79-year-old director of the company, came from Australia to attend the commemorations.

THE COLLEGE OF ADVANCED TECHNOLOGY, Birmingham, is again offering a full-time course of three weeks' duration on "Statistical Quality Control and Acceptance Sampling," commencing Monday, August 31. Although primarily intended as an introduction to the subject, the course will provide the basic training necessary for quality control engineers. The first fortnight will be spent in covering the general principles and procedures of quality control. The final week will be devoted to lectures by specialists from industry, and to visiting the works of firms employing quality control. Further details and application forms can be obtained from the Registrar, College of Advanced Technology, Gosta Green, Birmingham, 4.

THE NEW No. 4 BLAST FURNACE at the Port Kembla Steel Works, N.S.W., of Australian Iron & Steel, Limited, major subsidiary of the Broken Hill Proprietary Company, Limited, was blown-in on Thursday, May 28. The furnace, designed, manufactured and erected by the Ashmore, Benson, Pease & Company, Limited (of the Power-Gas Group), Stockton-on-Tees, has a hearth diameter of 29 ft.. and is reported to be the largest blast furnace in the southern hemisphere with a nominal capacity of 1,700 tons of pig-iron per day. The contract for Ashmore, Benson, Pease & Company, Limited, valued at about £3 million, included the supply of the blast furnace and auxiliary equipment including scale cars, an orebridge with 270-ft. span and 18-ton capacity grab, and two ore unloaders with 15-ton capacity grabs. The furnace itself stands 273-ft. high.

Personal

Mrs. M. E. Carter has been appointed to the board of Ada (Halifax), Limited.

Mr. P. Wright has been appointed a director of Buckley & Taylor, Limited.

Mr. W. T. Gardiner has been elected a director of Smith & Wellstood, Limited.

Mr. John V. Sheffield has been elected a director of Mechans, Limited, Glasgow.

Mr. A. Chamberlain has been appointed a director of J. Brockhouse & Company, Limited.

Colonel P. H. Jones has been appointed a director of the Halesowen Steel Company, Limited.

Mr. W. Cusworth has been appointed a director of the Brightside Foundry and Engineering Company, Limited.

Mr. John P. Le Grand, a director of Le Grand, Sutcliff & Gell, Limited, a member of the Stone-Platt Industries group, has retired.

Mr. Peter Middlemas, a director of the Birmingham Railway Carriage & Wagon Company, Limited, has been elected senior vice-president of the Birmingham Chamber of Commerce.

Sheepbridge Stokes, Limited, announce the appointment of Mr. Michael E. Southway, of 89, Bishop Street, Bristol, 2, as technical representative in the South-West England and South Wales areas.

Mr. J. W. Gardom is visiting Israel for a short time in connection with the installation of a steel foundry at Tel Aviv. He will also make calls on the various Ministeries at Tel Aviv, Jerusalem and Haifa.

Mr. W. T. Hale, sales director of Thos. Marshall & Company (Loxley), Limited, is visiting the Argentine, Brazil, Chile and Uruguay as part of his firm's efforts to increase its business with the Latin American market.

Mr. John Dearden, assistant superintendent (metallurgy division) British Railways Research Department, Derby, has been appointed superintendent of the division in place of Mr. T. Henry Turner, who has retired.

Mr. Arthur G. Jones, former director and general manager of Broom & Wade, Limited, has been appointed managing director of Guy Motors, Limited, from July 1. He succeeds Colonel A. Jerrett who has retired for health reasons.

Mr. Henry Allen, industrial relations manager of the Yale & Towne Manufacturing Company, British Divisions, has been elected chairman of the Wolverhampton and Black Country branch of the Institute of Personnel Management for the coming year.

New appointments for Bowmaker (Plant), Limited, include Mr. W. J. Lloyd as South Wales area manager; Mr. Dennis M. Beddows as sales promotion manager; Mr. F. J. Butler as used-equipment manager, and Mr. Jack Cooper as representative in the south west area.

Mr. H. R. Smith has been appointed executive vice-president of the aeronautical division of A. V. Roe Canada, Limited. He succeeds Mr. F. T. Smye who has resigned. Mr. J. L. Plant, president of Avro Aircraft, one of A. V. Roe Canada's subsidiary companies, has also resigned.

Mr. H. Humphries, managing director of Hadfields, Limited, has been appointed chairman of Millspaugh, Limited, a subsidiary company, in succession Dudley Gordon, who has resigned from th Lord Dudley Gordon remains chairman of H Mr. R. C. Heys, managing director of Mi has been appointed deputy chairman.

Mr. William Turnbull has received a pre on his retirement as general manager of Bl Docks & Shipbuilding Company, Limited. sentation was made by his successor. Mitcheson. Mr. Turnbull's retirement bring end an association of nearly 50 years with building and repairing industry. He had been manager of the Blyth yard for 17 years.

Mr. J. Stuart Anderson, who recently from the position of Deputy Provincial Treasur Province of Manitoba, has been elected assista vice-president and also assistant treasurer of t national Nickel Company of Canada, Limit Anderson has also been elected assistant vice- and assistant treasurer of the International Nicl pany, Inc., the company's United States subsid

New chairman of the governors of the Bir College of Advanced Technology is Mr. J. general manager of the Hymatic Engineering C Limited, Redditch. A governor of the Colleg past nine years, Mr. Hunt is also chairma governing body of Redditch College of Furthe tion and a member of the general and executive of the British Association for Commercial an trial Education.

Dr. L. L. Ross has been appointed director of Elliott Brothers (London), Limite sidiary of Elliott-Automation, Limited. Mr. L will continue to be chairman and chief executi E. O. Herzfeld, the controller, has, in additi appointed deputy managing director; and M Fairbanks and Comdr. H. Pasley-Tyler h appointed assistant managing directors. M Upsdell, secretary of the company, has jo board.

Mr. R. F. Newman has been appointed director of Transport Equipment (Tho Limited, and a director of John I. Thornycroft pany, Limited. Lieut.-Comdr. J. W. Thor who was elected deputy-chairman of the lat pany in September of last year, has relinqu post of managing director of Transport E (Thornycroft), but will continue to be chairma board of that company. Captain G. Villar L. L. Holt have retired from their executive and from the board of John I. Thornycroft. Cameron has been appointed general man Mr. F. B. Crabtree, commercial manager, of pany's Southampton works.

Mr. Verdon O. Cutts, F.I.M., is resuming sulting practice from his home address, 1, Lodge, Hillside Road, St. Albans. There ca few people who have had a wider experience o metallurgy than Mr. Cutts. In his early pioneered experiments on electric melting but later turned his attention to the develo electric heat-treatment plant. In 1929, he j General Electric Company, Limited, when h ized the process heating department, coverin furnaces, melting and heat-treating includi current, di-electric and infra-red heating fo range of industries. He has travelled widely quite a time in South Africa. In 1953, he dent of the electric furnace section of the Pa national Congress on Electro-heat.

Raw Material Markets

Iron and Steel

Foundries in many parts of the country have just resumed work following the annual holidays. During the break repairs to plant and cupolas were undertaken, while there was also a general suspension in the receipt of raw materials during the holiday period, stocks at most foundries being quite sufficient to cover requirements on the resumption of production.

Makers of all grades of foundry pig-iron and hematite have tonnages to spare from their current outputs and have also substantial stocks which they are anxious to reduce. Apart from the low-phosphorus irons, which continue in good demand, the call for all other irons is moderate and well below the capacity of the furnaces. In high-phosphorus irons and hematite many producers are working below capacity, but still are unable to dispose fully of the reduced tonnages, and the continued process of placing consignments into stocks to add, in many instances, to the appreciable quantities already held by the makers is uneconomic and costly.

The makers of castings for the motor vehicle trade have good order-books and the prospect of continued production at satisfactory levels for some time ahead. Some of the foundries supplying castings to the machine-tool trade report a slight improvement in business, but the foundries producing high-duty castings for other users could undertake more business than that at present being received. Most of the light foundries have room for a much larger volume of work than current orders provide, while the jobbing and textile foundries are also short of orders.

Adequate supplies of scrap continue to reach the foundries, although the better and heavier grades of cast-iron and machinery scrap are not so plentiful as other grades. Foundry coke deliveries are satisfactory and ganister, limestone, and firebricks remain in good supply.

The improved trade at the re-rollers is maintained, while the demand for small bars and light sections is now on a much-increased scale, and there is a heavy call for reinforcing rods. With the present requirements for steel semis many of the steelworks are committed for their outputs for the next few weeks.

Symposium on Electrometallurgy

In the spring of 1960, the Electrometallurgical Centre of the Italian Metallurgical Association (AIM) is organizing, in Milan, a symposium on the electrolysis of molten salts and the production of special non-ferrous metals by electrothermic methods. There are to be visits to research institutes and electrometallurgical works after the symposium. Registrations and papers should be sent to the secretary of AIM before December 31. Preprints will be available from the secretary of the *Associazione Italiana di Metallurgia*, via Moscova 16, Milan, Italy.

Import Duty on Ferro-cerium

The UK Treasury have made the Import Duties (General) (No. 8) Order, 1959, which increases from 10 per cent. to 20 per cent. *ad valorem*, the import duty chargeable under the Import Duties Act, 1958, on ferro-cerium and other pyrophoric alloys in pieces weighing not more than 4 oz. The Order came into operation on July 2 and was published as Statutory Instruments 1959, No. 1250.

POA " Minibition " and Courses

For the tenth year in succession, the Purchasing Officers' Association has organized a " Minibition," and this year it is to be held in Folkestone from September 24 to 26. One-hundred-and-four companies have taken up the 124 stands available, and a very wide range of industrial products will be covered by the displays. As in previous years, in the competition for the best stands, two awards will be made—one for the educational value of the display and the other for attractiveness of design. Amongst the stands with a foundry interest will be those of:—A.P.V.-Paramount, Limited (stainless- and special-alloy steel castings); Birfield Industries, Limited (filters, control valves, transmission units and drives, bearings, castings, etc.); British Investment Casters' Technical Association (precision investment castings); Crane, Limited (valves and pipe fittings); Firth-Vickers Stainless Steels, Limited (Staybrite and stainless steels); Hadfields, Limited (precision castings); R. J. Hunt & Son, Limited (quality grey-iron castings); Langley Alloys, Limited (alloy valves, castings and bar in bronzes); D. Napier & Son, Limited (high-precision investment castings); Samuel Osborn & Company, Limited (steel castings, etc.); P.I. Castings (Altrincham), Limited (investment castings); Sterling Industries, Limited (plain bearings, phosphor bronze, shell-mould castings); Henry Wallwork & Company, Limited (iron castings); West Yorkshire Foundries, Limited (iron and aluminium castings); and Wilmer Lea (Wheels and Castors), Limited (iron castings).

Courses

The following courses are also announced by the Purchasing Officers' Association:—

Scottish senior buyers' course and regional conference to be held at the Golden Lion Hotel, Stirling, from November 19 to 21. For this non-residential course the cost is £3 13s. 6d. per day. *Senior buyers' course*, at the College of Aeronautics, Cranfield, Beds. from January 5 to 9, 1960 (to be repeated in September, 1960, if demand warrants). This is a residential course, the fee for which is £15 15s. 0d. *Industrial Buyers' Rôle in Constructional and Engineering Contracts*—a course for those involved in letting contracts for buildings and plant, to be held at the Stationers' Hall, London, E.C.4, from February 16 to 18, 1960; non-residential, fee £11 0s. 6d. *The Third Oxford Course*, comprising material studies, case studies and lectures for top level buyers, at Christ Church and Pembroke College, Oxford, from March 21 to 26, 1960; residential, £20. *Computer Course* at the College of Aeronautics, from January 5 to 9, 1960; residential, £20, and the *Operations Research Study Group* which will be combined with the Third Oxford Course from March 21 to 26; residential, £25. Detailed programmes of these courses will be available two months beforehand from the Association at Wardrobe Court, 146A, Queen Victoria Street, London, E.C.4.

THERE HAS BEEN A CRISIS in the affairs of the High Authority of the European Coal and Steel Community, as at a recent meeting the Council of Ministers openly differed with the Community's five-point programme for dealing with excess coal production. The three Benelux countries voted in favour of the High Authority's programme, but France, Germany and Italy voted against it. Thus the situation is still chaotic and no permanent solution is in sight.

Current Prices of Iron, Steel, and Non-ferrous Me

(Delivered unless otherwise stated)

August 12, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 6-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 6-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 11s. 6d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 6-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr., 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/72 per cent., cb + Ta, 19s. 9d. per lb., cb + Ta.

Ferro-manganese (standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons. £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—shi (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E £44 12s. 0d.; floor plates (N.-E. Coast), £43 1 angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, und and flats 5 in. wide and under, untested soft basic, and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 under 4 tons to 2 tons, £41 3s. 0d.; hoop and stri 100 tons and over, £38 0s. 0d.; uncoated strip mill c rolled, under 3mm. to 12g., 25 tons to under £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons a £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 t over, £66 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 nickel-chrome, £99 4s. 0d.; nickel-chrome-moly £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £234 10s. 0d. to £234 15s. 0d. months, £234 0s. 0d. to £234 5s. 0d.; set £234 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 2½d. rods, 243s. 0d. per cwt. basis; 20 s.w.g., 273s. 0d.

Tin.—Cash, £792 10s. 0d. to £793 0s. 0d.; three £790 10s. 0d. to £791 0s. 0d.; settlement, £793 0s. 0

Lead (Refined Pig).—First half August, £71 to £71 10s. 0d., first half November, £72 5s. 0d. to £72

Zinc.—First half August, £85 5s. 0d. to £85 first half November £83 2s. 6d. to £83 17s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all destinations, £119 7s. 6d.; rolled zinc (boiler pla English destinations, £117 12s. 6d.; zinc oxide (Re d/d buyers' premises, £97 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 9¾d. sheets to 10 w.g., 195s. 0d. per cwt.; wire, 2s. 7½d. metal 195s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £155; B6, £200.

Brass (High Tensile).—BS1400, HTB1, £187; £203; HTB3, £213.

Gunmetal.—BS1400, LG2, £191; LG3, £201; G £254; G1, 1%, £240.

Phosphor Bronze.—BS1400, PB1 (AID released BS1400: 90/10/1, £272.

Leaded Phosphor Bronze.—BS1400, LPB1, £211.

Phosphor Bronze Strip, etc.—Strip, 282s. 0d. p wire, 4s. 0⅛d. per lb.; rods, 3s. 3½d.; tubes, 3s. 3½ cast bars: solids 3s. 3d.; cored 3s. 4d. (Charles C Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. 0.056, 3s. 9½d. per lb.; round wire, 10g. in coils cent.). 4s. 2½d.; special quality turning rod, 10 pe ½ in. dia., in straight lengths, 4s. 1½d. All prices ar

Other Metals.—Magnesium, ingots, 2s. 3d. Antimony, English, 99 per cent., £190 0s. 0d. Quic ex-warehouse, £74 0s. 0d. Nickel, £600 0s. 0d. Alu ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB AB2, £243.

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* Average 68-70 per cent.

Obituary

mes Mitchell, former chairman and man-
ctor of Mitchell, Russell & Company, Limited,
lge ironfounders, has died.

ath is reported of Mr. Mathew Hay (53),
of the Glasgow branch of A. Cohen & Com-
nited, ingot and metal manufacturers.

s Carling & Company, Limited, of Shakes-
ass Works, Salop Street, Bolton, report the
their representative, Mr. W. E. Seddon, on

imes S. Webster, manager of Enamelled
oducts Corporation (1933), Limited, Durie
Leven, Fifeshire, Scotland, died suddenly
h.

ath has occurred of Mr. John Goodrich Kay,
since its inception in 1923 and chairman since
the Lafarge Aluminous Cement Company,
London, W.1.

ath has occurred, at the age of 68, of Coun-
iarles Cooper, a former joint managing
and head of the gas and chemical engineering
of W. C. Holmes & Company, Limited, Turn-
uddersfield.

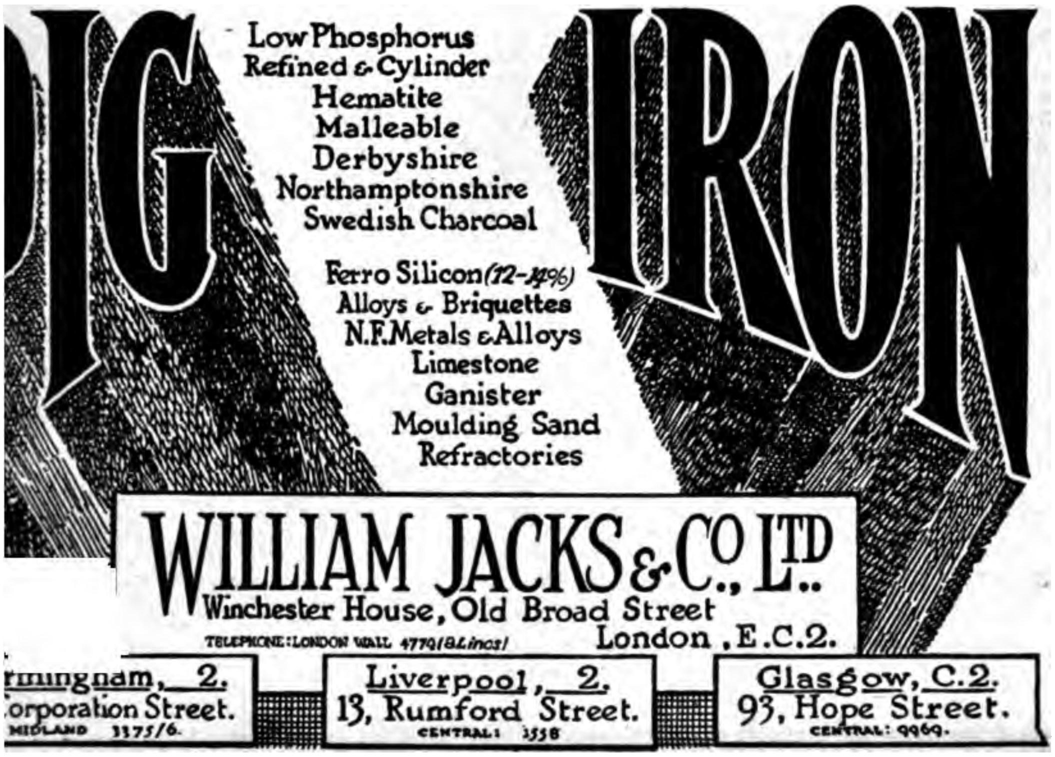
ath has occurred of Mr. Joseph Doughty,
r of the Moston Malleable Castings Com-
nited, Manchester. Mr. Doughty who was
been with the firm for 45 years, and was
lirector in 1945.

nt Weir of Eastwood, chairman and director
ears and 57 years respectively) of G. & J.
nited, Glasgow, died on July 2, at the age of 82. On his retirement as chairman and director in 1955 he was appointed the first hon. president of the Weir group of companies.

Mr. Joseph Bolton, former manager of Andrew Weir & Company, Limited, shipbrokers, Middlesbrough, for over 30 years and honorary secretary of the Middlesbrough and District Shipbrokers' Association for 25 years, has died at the age of 72. He joined the concern of Andrew Weir in 1907, and was manager from 1919 until retirement in 1952.

Sir Ronald Matthews, who died on July 1 at the age of 74, began his business career in the family steel business of Turton Brothers and Matthews, Limited, Sheffield, subsequently becoming chairman and managing director. He was Master Cutler in 1922 when he was only 37; president of Sheffield Chamber of Commerce in 1929, and president of the Association of British Chambers of Commerce in 1940-42. He was knighted in 1934. Sir Ronald had also served on the boards of a number of other concerns including the Legal and General Assurance Society, the Brush Group, and General Refractories, Limited.

Sir Frederick Pickworth, chairman of the English Steel Corporation, Limited, Sheffield, died on July 14 at the age of 69. He collapsed after speaking at a dinner which was given in recognition of his chairmanship of the Darlington Forge, Limited, a post he gave up in 1957 when he became Master Cutler. He was secretary of the English Steel Corporation from 1930 before becoming managing director in 1944. He was also chairman of Taylor Brothers & Company, Limited, Manchester, and of Firth-Vickers Stainless Steels, Limited, Sheffield and a Council member of the Federation of British Industries. Sir Frederick was knighted in 1957.


IG IRON

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London, E.C.2.
TELEPHONE: LONDON WALL 4779 (8 Lines)

rmingham, 2.
orporation Street.
MIDLAND 3375/6.

Liverpool, 2.
13, Rumford Street.
CENTRAL: 3558

Glasgow, C.2.
93, Hope Street.
CENTRAL: 9969.

Factories Act, 1959

The Factories Bill, which was introduced into the House of Commons in November, 1958, and completed its passage through Parliament early in July, received the Royal Assent on July 29. The new Act amends the Factories Acts, 1937 and 1948, and makes further provisions as to the health, safety and welfare of workers in factories, and other places subject to the Factories Acts. The Act does not come into operation at once. The Minister of Labour is given power to bring the provisions into effect by Order, and to appoint different days for different purposes.

In a Parliamentary written answer, the Minister, Mr. Iain Macleod, indicated that it was his intention to bring all the provisions into operation at the earliest practicable date. He intended, subject to consultations with interested organizations, to make an Order bringing about half of the provisions into operation on December 1. Certain of the other provisions—for instance the sections on cleanliness, dangerous substances, safe means of access and place of work, dangerous fumes, washing facilities, first aid—will involve preparatory work being done by the employers—for example, the construction of fencing, the provision of new equipment or the necessary training of workers—and some extra time must be allowed for these purposes.

Fire Provisions

The important fire provisions of the Act (sections 9 to 17 and 24) involve administrative changes affecting local authorities and the Factory Inspectorate, and these will have to be discussed with the local authorities concerned before the date of operation can be decided. Consultations are being started in the immediate future. Discussions with the British Transport Commission about the section extending the scope of factory legislation to railway running sheds have begun. The new provisions in section 8 (i) of the Act about examination of steam boilers will not be brought into operation until the Minister has received and considered the report of an Advisory Committee, under the chairmanship of Mr. G. C. Honeyman, Q.C., which he appointed last year to look into this question.

The new Act has three main objects; to improve the existing provisions with regard to fire precautions in factories: to place on the Minister of Labour and National Service the duty of promoting health, safety and welfare in places under the Factories Acts by collecting and disseminating information, and by carrying out, and assisting to carry out, investigations: and to revoke Defence Regulation 59, and replace it with a permanent, but more limited power to grant exemptions from the law regulating the hours of employment of women and young persons.

In addition, the Act increases the maximum fines which can be imposed for contraventions of factory law, and strengthens certain existing safety provisions of the Factories Act, 1937, including those relating to dangerous substances and fumes, lifts and cranes, and the maintenance of floors, passages and stairs. The Act also extends the scope of factory legislation to cover railway running sheds, where running repairs are carried out to locomotives.

After 61 years' continuous service at the Vulcan Ironworks of Green & Carter, Limited, Winchester, Hants, 74-year-old Mr. A. COOMBES recently retired. *In recognition of* his long service he was presented *with a cheque by the directors* of the company.

Clean Air Act Order

Section 11 (4) of the Clean Air Act, 195
relates to smoke control areas, empowers the
of Housing and Local Government, by o
exempt any class of fireplace (meaning furna
or stove), upon such conditions as he may
from the provisions of the section—if he is
that such fireplaces can be used for burning f
than authorized fuels without producing smo
substantial quantity of smoke. An earlie
exempted oil-burning furnaces, and there
been one issued (No. 1207, 1959, in operati
July 17) which exempts fireplaces equip
mechanical stokers, and two specified stoves.
and conditions are as follow:—

Class of fireplace	Conditions
Fireplaces, other than fireplaces fired by pulverized fuel, constructed on or after December 31, 1956, and equipped with mechanical stokers, or adapted on or after that date for use with such stokers.	The fireplace shall be maintained and ope minimize the emissio No fuel shall be used that for which the stoker was designed.
The fireplace known as the solid fuel Ductair unit, manufactured by Radiation, Limited.	The fireplace shall be maintained and ope minimize the emissio and in any case in with the manufactur tions.
The fireplace known as the Fulgora slow-combustion stove, manufactured by Fulgora Stoves, Limited.	The fireplace shall be maintained and ope minimize the emissio and in any case in with the manufactur tions. No fuel shall b than wood waste condition.

DSIR Technical Digests

As was recently announced in the JOUR
Technical Digests of the Department of Scie
Industrial Research are again being published
Several items of interest to foundrymen are
in the June issue, amongst them being a
density indicator, which has been produced t
when dark smoke is being produced in a
Although mainly intended for Lancashire and
type boilers, it is possible to adapt the indi
some other types. News is also given of a du
screen consisting of an open-weave material
nated with a non-drying adhesive; a portab
point; an approach warning system which
developed primarily to give warning of appro
two cranes are operating on the same overhe
a midget hoist, made of N.S.4 aluminium
whilst small enough to fit into a coat pocke
to be capable of lifting or pulling weights
1,000 lb. Yet another atmospheric dust inst
dealt with, this time for ascertaining the
contamination of the air; details are also
fabric tanks for transporting liquids, and of
inspection aid which replaces the watchma
glass for the examination of small parts.
these *Technical Digests* are obtainable from
at Charles House, 5-11, Regent Street, Lond

Mr. R. JAMES, Mr. J. F. ORMISTON and
WHEELER have resigned from the board of th
Hematite Steel Company, Limited.

Foundry in a Church Tower

It is unlikely that the Charlemont Barracks cast-iron altar in its Catholic Church can be rivalled elsewhere in Britain as an example of ecclesiastical casting. (This Irish altar, cast at the Armagh Foundry in 1848, was described in the JOURNAL during January, 1959.)

However, South Wales and Monmouthshire—as might be expected from its industrial history—can show a few unusual examples of the use of iron in church architecture and decoration—albeit not on a par with the craftsmanship of the Armagh altar. The threshold of the porch at St. Peter's Church in Blaenavon, for instance, is iron cast from the local works. The church itself was built in 1804 by Hopkins and Hill, who at that time owned the extensive coal, iron and steel works which comprised nine blast furnaces, three rolling mills and one tyre mill.

The only producing iron-ore mine left in Wales is that at Llanharry on the verge of the Vale of Glamorgan, worked for many years by the Glamorgan Hematite Iron Ore Company. In its church is an iron coat-of-arms of the Gibbons family of Trecastle. This unusual medium for a coat-of-arms commemorates not only the family but also the ancient industry of the neighbourhood, for iron has been mined here for at least 700 years of recorded history—and prior to that by the Romans.

Within sight of the Llanharry iron-ore mine is the hill-top town of Llantrisant, where the parish church yielded the unique discovery of a foundry actually within the church precincts. When the last restoration of the parish church took place in 1893, the furnace and moulds for casting the bells were located beneath.

Another Cast-iron Clock*

Back in the Middle Ages (and of course much later) blacksmiths were clockmakers, and those whose skill was perfect in the craft were called "clocksmiths." These old-time craftsmen worked, however, in wrought iron, but there is a record of one man who made a clock from cast parts. He was James Scott of Ballynahinch, Co. Down, Ireland, and he was, in fact, a conventional clockmaker. In 1832 he was commissioned to make a large clock to strike the hours for Lord Roden's mansion house. Scott decided to make the clock parts as castings, the parts including the frame plates, wheels, shrouds of the lantern pinions, dial, hands, and weights, etc. Only the pinions were to be made of steel and the striking levers.

All the castings were produced in Boyd's Foundry, Belfast, under Scott's supervision, and were finished by him in his own workshop. It was said of the wheels that they were of great dimensional accuracy, and finely geared, in order to reduce friction *a desideratum* in mechanics. The frame of cast iron was well cast and the pivots of the pinions were bushed with brass, slot-keyed in the castings. The dial was convex, like a dish, with bars for the numerals raised from the plane of the casting. The curvature of the dial was convex to reduce wind pressure on the hands for, when in position, the clock was exposed to mountain and marine gales. The clock hands were cast to the sweep required.

This was perhaps the only instance of cast iron being used as the major material for clockmaking, although frames for tower- and turret-clocks were of course made of cast iron by many clockmakers.

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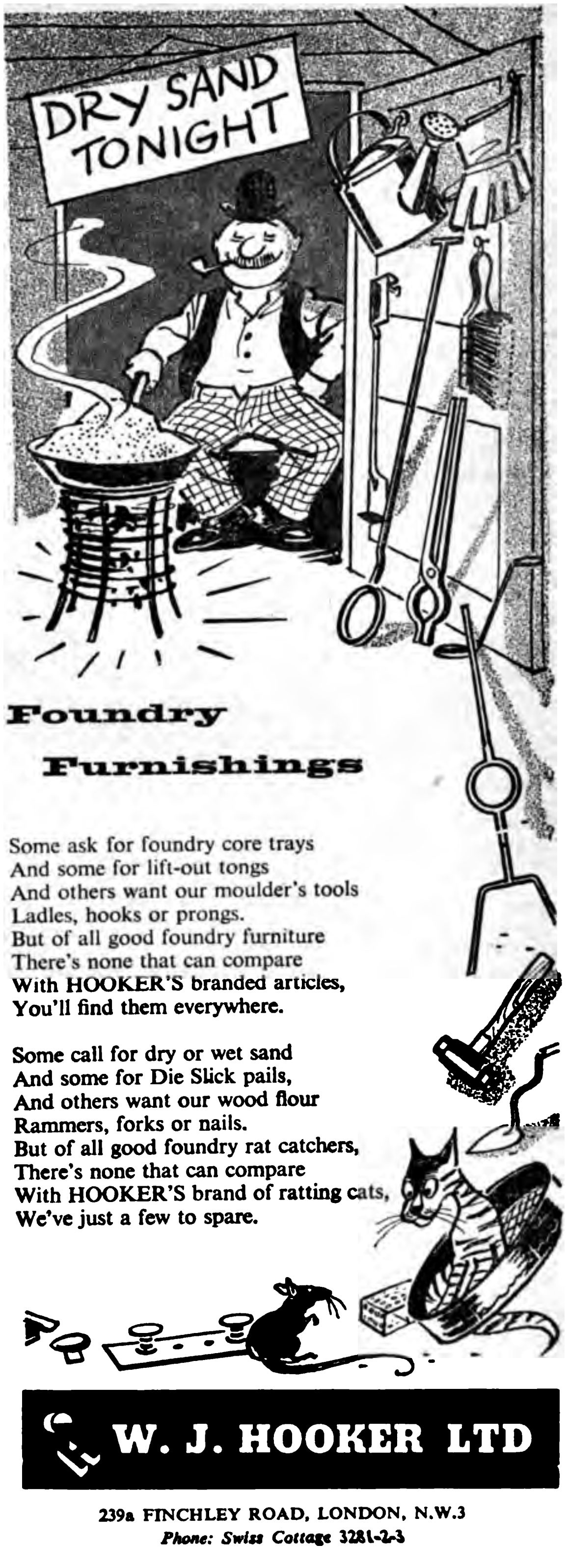
* An account of a cast-iron clock at Tredegar appeared in the JOURNAL, August 7 1958.



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Book Reviews

Applied Mechanics—Proceedings of the Third US National Congress, 1958. Published by Pergamon Press, Limited, 4 & 5 Fitzroy Square, London, W.1; price £7.

This book is an authoritative work of 864 pages giving information on over 100 subjects; it contains the complete texts of four invited general lectures and 97 technical papers. The general lectures deal respectively with "Linear Thermodynamics and the Mechanics of Solids," "Some Aspects of Boundary-layer Flow in Subsonic and Supersonic Air Streams"; "A Survey of the Theories of Creep Buckling," and "Rotational Symmetric Problems in the Theory of Thin Elastic Shells."

The technical papers are arranged in four groups under the following headings: (1) Dynamics, Vibrations, Elastic Waves. (2) Elasticity, Elastic Structures. (3) Plasticity, Viscoelastic Flow, Fracture, and (4) Fluid Flow, Serodynamics, Heat Transfer.

On occasion, a study of advanced theoretical investigations has been decried as unnecessary for the "man in the shop," but it must be remembered that in all branches of applied science what is regarded as the borderland of knowledge to-day becomes the everyday experience to-morrow, and in the volume under review, are to be seen some of the points of growth from which to-morrow's practical developments will come. It is, therefore, incumbent upon all who are producers and users of materials to make themselves familiar with the possibilities for their more economic utilization.

The papers in this volume cover an extremely wide range of interests, and present a broad picture—within the field of applied mechanics—of the research activities in which American universities, industrial and Government research organizations are engaged. This work constitutes a most valuable record, and can be recommended for careful study by engineers, designers, and all those responsible for the economic utilization of engineering materials. J. E. GARSIDE.

Filler Metals for Joining by Orville and Barnett. Published by Chapman & Hall, Limited, 37 Essex Street, London, W.C.2; price 57s. 3d. post free.

This book contains detailed information on the use and applications of the majority of coated electrodes, bare wires for gas-shielded welding, automatic welding, brazing and soldering that are manufactured in the United States. Eight chapters are devoted to coated electrodes for welding mild and low-alloy steels, and the reasons for the necessity for so many different types are admirably set down.

Whilst there is no doubt that this book will find a place at the elbow of every American welding engineer, its usefulness in Great Britain will be more restricted since it deals exclusively with American-designated filler wires. For those who read American welding literature or work to American specifications, the book will be an invaluable ready reference, since it gathers together all the relevant information about filler wires and will save endless searching through specifications.

It is rather novel to have a book which includes a great deal about weldability written from the standpoint of the filler metal rather than the parent metal, and much of the information given concerns the British welding equivalent.

It is to be hoped that future editions will contain an appendix listing the main British equivalents which would make the book more readily accepted over here. There is little in this book for the foundryman who wishes to repair castings by welding.

E. N. GREGORY, A.I.M., A.M.INST.W.

Publications Received

Use of Fulbond in Foundries. Issued by the Full
Earth Union, Limited, Patteson Court, Nutfi
Road, Redhill, Surrey.

This 40-page brochure is extremely informative a
covers a wide range of applications. Montmorillon
which is the basis of Fulbond, is both well a
interestingly covered in a special introductory pa
graph. The two main grades of Fulbond, 4A and
have their origins in two separate locations, the forn
coming from Surrey and the latter from Somers
Their uses, which are somewhat different, are set
on page 5. Some three pages are used to detail
fundamental properties, and thereafter, specific ap
cations to naturally-bonded, semi-synthetic and ot
types of moulding sands are dealt with. Anot
application is in the case of the CO_2 Process. Fina
there is a series of graphs covering the results obtai
when using Fulbond with 21 well-known sands. T
is an extremely useful publication to have in a foun
manager's office.

Report of the Research Council for 1958. Publish
for the Department of Scientific and Industr
Research by Her Majesty's Stationery Office, Yo
House, Kingsway, London, W.C.2; price 3s.
net.

In this Report the Council envisages that the expen
ture on revenue and capital grants to research assoc
tions will rise by about a third, because their scope a
activities are steadily growing, but a large percent
contribution is expected from industry. The p
gramme outlined entails an expenditure of £61,000,
in 1959 to 1964, compared with £36,000,000 for
1954-59 period.

The Report suggests that research associations co
undertake sponsored researches, provided the w
entailed does not clash with the general research p
gramme scheduled to be carried out. More money
to be spent on research work carried out in
universities.

S.G. Iron in Steelworks Plant by A. B. Everest, Ph
Issued by the Mond Nickel Company, Limit
Thames House, Millbank, London, S.W.1.

The publicity for castings, belatedly, is aligning it
with the high standard set by other industries, and
brochure is in every way equal of material iss
anywhere. The contents take each of the m
departments of a steelworks and show just where s
iron can be used to advantage. Whilst the broch
is written for steelworks, quite a few of the applicati
shown are equally applicable to foundries, and found
men could very usefully "take their own medici
Yet, many of the potential users manufacture s
castings themselves and home productions initially ca
an economic advantage. The booklet is backed in
attractive slate-blue cover; the letterpress is easy
read, and the illustrations—drawn from three contin
—are excellent.

British Engineers' Association Handbook, 1959. P
lished by the British Engineers' Association,
Victoria Street, London, S.W.1; price 21s.

This is a very complete directory of the meml
of the British Engineers' Association, as it lists
Section 1, the member-firms' names and addre
agents and type of production. Section II expands
information by full-page advertisements. The t
section is a classified directory carried out in
languages, and the fourth covers trade marks and
like. It is a very useful directory to have at h

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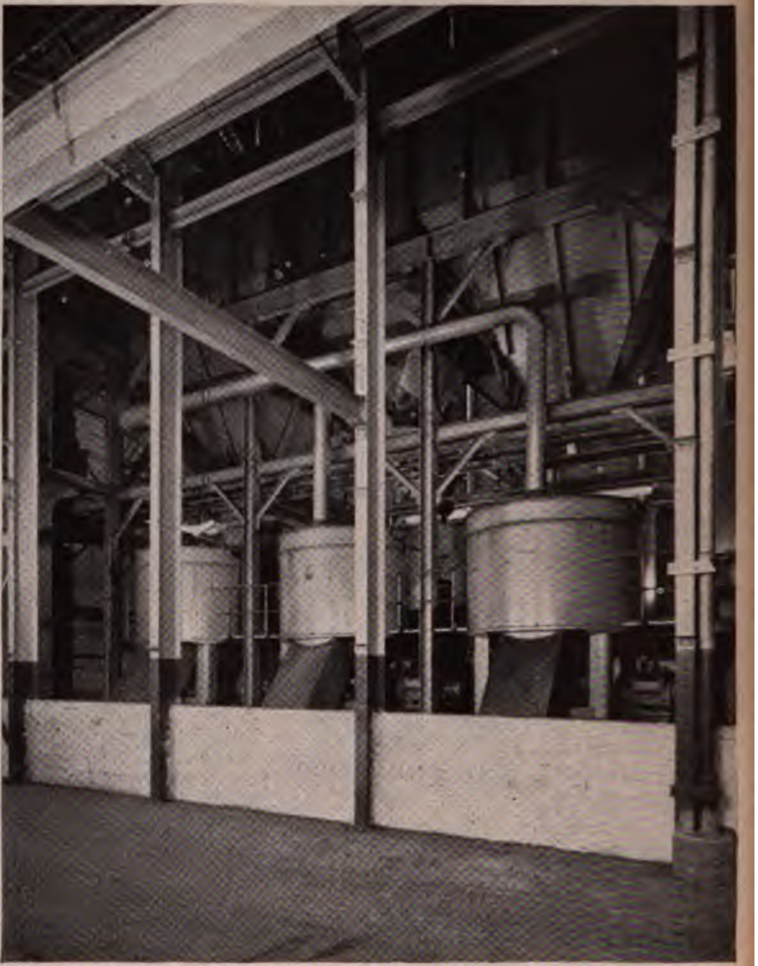

- Photograph shows: Three No. 3F size August-Simpson Mix-Mullers with Returned Cleaned Sand and New Sand Storage Hoppers. A travelling, electrically operated Batch Measuring Hopper (fitted with Weighing device) charges the sand into each Mix-Muller. The Mixed Sand is discharged from the Mix-Mullers on to a Belt Feeder Conveyor for transfer to the Distribution Belt Conveyor.

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The Case of the Welsh Foundries

Recently in the House of Commons, Mr. George Thomas, M.P., brought up the question of the closing of the B.S.A. foundry at Cardiff. It was not a very large concern, about 116 men being employed. Of these 77 were dismissed, but at least 41 have since found other jobs. Rightly, Mr. Thomas expressed concern for apprentices whose training is interrupted by the closing of foundries and we hope that steps will be taken in such cases to ensure the continuation of the apprentices' training at other firms. The Parliamentary Secretary to the Ministry of Labour and National Service made the following serious statement: " The difficulty . . . is that in this industry the conditions are changing in such a way that the volume of orders in future is unlikely to be sufficient to employ all those who have been employed in the industry in the past."

What the Parliamentary Secretary meant by volume is not quite clear. If he referred to value then it is as well to bear in mind that an expanding business is being done in the more expensive kinds of castings. If weight is to be understood, then a single order for a new tube railway in London would, over the years of its construction, profoundly affect the output of iron castings.

We regard this case of the B.S.A. Cardiff foundry as a typical case of arguing from the particular to the general. To have made a debate profitable, all the foundries which have been closed during the last two years should have been considered. Then a variety of reasons would have come to light and included such factors as:—The area of a foundry being put to better use as a machine-shop; over capacity in one section of the industry; too much reliance being placed on the one big customer; inability to conform with the newest foundry regulations (for the smaller " fry "), and a whole list of causes coming under the general heading of inefficiency—either in manufacturing or on the sales side. By and large, far too many founders have relied on local firms to provide them with work. It is true to state that one South Wales foundry is regularly despatching castings to all quarters of the United Kingdom. Perhaps and probably salesmanship is the weakest link in the chain of the foundry industry. There are, it is pleasing to state, some brilliant exceptions.

Giddings & Lewis/Fraser, Limited, Link-up

Douglas Fraser & Sons, Limited, Arbroath, and Giddings & Lewis Machine Tool Company, of Fond du Lac, Wisconsin, USA, announce the formation of a new British private company named Giddings & Lewis-Fraser, Limited, having an authorised capital of £1,516,327. The purpose of this company is to acquire and continue the engineering business of Douglas Fraser & Sons, Limited, and to manufacture Giddings & Lewis horizontal boring, drilling and milling machines. Fraser textile-machinery activities will be conducted by the new company, but the other textile manufacturing interests of Fraser will continue to be operated, as in the past, by Douglas Fraser & Sons, Limited.

To establish continuity of management Mr. Norman Fraser has been appointed chairman, Mr. John G. Fraser, managing director, and the other Fraser nominees to the board are Mr. John Macgregor and Mr. Charles N. Thomson. Directors nominated by the USA company are Mr. Ralph J. Kraut, president of Giddings & Lewis Machine Tool Company, Mr. William E. Rutz, Mr. Russell E. Hanson, and Mr. Morton R. Swift, vice-president Giddings & Lewis foreign operations, resident in London.

The Rockwell Machine Tool Company, Limited, Welsh Harp, Edgware Road, London, N.W.2, will retain the sole selling rights in the United Kingdom for all Giddings & Lewis designed machine tools, including those manufactured by the new company. Mr. Milton H. Nichols, present European sales manager of the American company, will continue in this capacity, with his headquarters in London. Sidney G. Jones & Company, Limited, 8, Balham Hill, London, S.W.12, will remain sole selling agents in the United Kingdom for Fraser Endomatic machine tools. The traditional products of the Fraser engineering division which will be now manufactured by the new company are textile machinery, machine tools, gears and gear-reduction units. This agreement brings together two very progressive old-established companies, each of which has celebrated its centenary.

Douglas Fraser & Sons, Limited

From the sailcloth power-loom weaving factory started in Arbroath by Douglas Fraser in 1832, the firm of Douglas Fraser & Sons, Limited, has developed into one of the best equipped foundries and engineering shops of its kind in the country, with a present-day payroll of over 700 employees, nearly 30,000 sq. ft. of floor space and a developable ground area of approximately 7½ acres. The works at Arbroath are completely self-contained, with a Meehanite foundry (licensed in 1936) served by its own patternmaking department; modern machine shops and toolroom; heat-treatment and forge departments; and fabricating and erecting shops. The foundry will have to be extended as the new lines of machines to be made under the new conditions will demand heavier castings than it is now capable of making.

Giddings & Lewis Machine Tool Company is one of the largest of its kind in the United States and incorporates companies formerly known as the Cincinnati Planer Company, the Cincinnati-Bickford Tool Company, Davis Boring Tool Company, Kaukauna Machine Corporation, and the Prescot *Company, Menominee.*

Anniversary Meeting at Coalbrookdale

In 1709, the Quaker ironmaster and founder, Abraham Darby, introduced a process of smelting iron with coke which made economically and technically possible the rapid expansion of the iron industry. For centuries the small output of iron in this country had relied upon charcoal as the reducing fuel, and this state of affairs continued until the mid-18th century, when the iron industry of the UK was dying, and more and more iron was imported from overseas. At this period, Darby's process, developed originally at Coalbrookdale on the banks of the Severn, in Shropshire, began to be more widely used and by the close of the century coke had largely displaced charcoal as the basic fuel in iron smelting. By that time also, the motive power of the new era provided by the steam engine had substantially improved the blast-furnace process.

The achievement of Abraham Darby will be recognized by a three-day meeting on September 23 to 25, in Birmingham and Coalbrookdale, to commemorate the 250th anniversary of coke smelting, and the establishment of the Coalbrookdale Works. A committee has been set up under the chairmanship of Sir Frederick Scopes to organize the meeting and the following is an outline of the programme.

Wednesday, September 23: In the evening the opening lecture will be given at the University of Birmingham by Professor T. S. Ashton on the "Economic and Social Background of the Iron Industry in the Eighteenth Century."

Thursday, September 24: Presentation and discussion at the University of Birmingham of the following four papers:—(1) "Charcoal Iron Industry in Great Britain with special reference to Shropshire and the Development of the Industry up to 1750" by Mr. B. L. C. Johnson. (2) "The Contribution of the Darby Family to Ironmaking and the Iron Industry," by Dr. A. Raistrick. (3) "Coalbrookdale: 1709," by Dr. R. A. Mott and (4) "Ironfounding Past and Present" by Dr. J. G. Pearce, C.B.E. For the evening a dinner has been arranged at the Grand Hotel, Birmingham.

Friday, September 25: Visit by motor coach to the Coalbrookdale furnace which has been generously restored by Allied Ironfounders, Limited, which firm has also established a museum nearby. The visit will include tours of other sites of interest in the neighbourhood.

Further details and forms of registration can be obtained from the secretary, Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1.

Industrial Designs Protection

The President of the Board of Trade has appointed a committee under the chairmanship of Mr. Kenneth Johnston, Q.C., "to consider and report whether any, and if so what, changes are desirable in the law relating to the protection of industrial designs. In framing their recommendations the committee should include consideration of the desirability of enabling United Kingdom designs to receive cheap and effective protection in other countries on the basis of reciprocity." Any person or organization desirous of submitting suggestions or of giving evidence upon matters which fall within the terms of reference of the committee is invited to communicate with the joint secretaries, Designs Committee, Patent Office, 25, Southampton Buildings, London, W.C.2.

IBF Conference at Scarborough

Report on the Annual Meeting, Technical and Social Proceedings.

The June conference of the Institute of British Foundrymen, held in Scarborough under the auspices of the Tees-side branch, was an outstanding success and many of the participants pronounced it the best they had ever attended. What follows is a condensed report of the proceedings, it being felt that it is necessary to put this on record—with apologies for delay in publication due to the printing dispute.

The annual conference of the Institute of British Foundrymen was held in Scarborough, Yorkshire, during the week commencing Monday, June 8. In its basic arrangements, it resembled previous conferences with the exception that in this case the works visits were staged on the Thursday and further technical sessions on the Friday, instead of the usual procedure of concluding with works visits before the final dinner on the Friday. The registration for the conference—approaching 600—was not the largest attendance at an annual conference but it is a personal impression of the writer that more people stayed for the full duration of the programme than is usual.

Many of the conference delegates assembled in Scarborough with their wives (and in some cases families) on the Monday of conference week; Tuesday was devoted to General Council and com-

IBF Scarborough Conference scenes: (left to right) (a) Mrs. Draycott, Lady Fitton, Mr. H. H. Draycott and Sir Charles V. Fitton at the banquet reception; (b) Mr. A. E. Peace (retiring president) investing the incoming president, Mr. C. H. Wilson, with the Chain of Office (c) Mr. Barrington Hooper (chairman, FOUNDRY TRADE JOURNAL) *congratulating Mr. J. B. Hollis after handing him the British Foundry Prize—Mr. T. C. Wilson (joint author with Mr. Hollis), who had just been awarded the British Foundry Medal, is in the background; (d) Mr. C. M. G. Wallwork (Lancashire branch president) and Mrs. Wallwork with Mr. and Mrs. C. G. While, also at the banquet reception.*

The past-president, Mr. A. E. Peace, presenting the certificate of honorary membership to Sir Frederick Scopes.

mittee meetings, with a civic reception in the evening. On Wednesday morning, the annual general meeting of the Institute was held, followed by the Address of the new president and the Edward Williams' lecture, the afternoon being devoted to technical sessions. The daytime on Thursday and Friday was, as previously mentioned, occupied by works visits and technical sessions respectively, while on the Thursday evening there was a visit to the theatre and on Friday evening the concluding social event—a dance and cabaret show. The attractive background of Scarborough as a seaside resort with excellent hotel accommodation and adequate conference facilities contributed much to the success of the whole proceedings.

Mr. A. Garden (left) Dr. L. J. Petrzela (Czechoslovakia) and Mr. J. M. Hunter chatting informally at one of the social events during the conference.

The civic reception which, for many of the members, ladies and guests, really opened the proceedings at Scarborough was held at the Olympia Ballroom on the sea front. There was no formal reception of members by the Mayor, but both he (Councillor J. A. Kennedy, J.P.) and the Mayoress were present with the official party consisting of the retiring president, Mr. A. E. Peace, the then senior vice-president, Mr. C. H. Wilson, and junior vice-president, Mr. G. R. Shotton, and the secretary, Mr. G. Lambert, all of whom were accompanied by their ladies. During the evening, the Mayor expressed a welcome to the Institute and Mr. Peace, addressing the Mayor and Corporation, voiced the thanks of the assembly for the hospitality extended. Members and ladies were subsequently entertained by a cabaret show and dancing, and buffet refreshments were provided.

Annual General Meeting

Wednesday, June 10

The business part of the conference commenced with the 56th annual general meeting of the Institute held on the morning of Wednesday with Mr. A. E. Peace in the chair. A special welcome was first extended to overseas visitors, who included Mr. J. H. D. Hobson (Northern Rhodesia); Mr. G. B. Hobbs and Mr. S. Webster (South Africa); Mr. H. A. Burton (Canada); Mr. R. B. Whitelaw (Australia); Mr. and Mrs. M. C. M. Grandpierre (France); Dr. F. Hofmann (Switzerland); Mr. and Mrs. J. McCracken and Mr. S. P. Banerjee (India); and Dr. L. J. Petrzela (Czechoslovakia). Following the minutes and apologies for absence, the adoption of the annual report of the Council for the session 1958/59 (previously published) was proposed by the president, seconded by Mr. J. Blakiston (past-president) and approved without dissent. In a similar manner, the balance sheet and accounts were disposed of on the proposition of Mr. N. P. Newman, hon. treasurer, supported by Mr. H. J. V. Williams.

Mr. M. M. Hallett, as chairman, then proposed adoption of the Institute's Technical Council report and in doing so outlined some of the salient features of the year's activity and the Institute's relations with other technical bodies. Special reference was made to the report of the TS 46 sub-committee (dealing with the effect of mould materials on the cooling rate and physical properties of cast metals) given as the Institute's sponsored paper at the April convention of the American Foundrymen's Society and which was also to be discussed during the IBF conference.

Dr. D. V. Atterton, vice-chairman of the Technical Council, seconded the proposition and briefly surveyed the activities of various other sub-committees, announcing the formation and terms of reference of four new sub-committees, making a total of 15 at present active.

Presentation of Awards

Mr. Peace from the chair then officiated in the ceremony of presentation of Institute awards made

Part of the top table during the annual banquet held in the Grand Hotel, Scarborough: (from left to right) Mrs. G. R. Shotton, Mr. T. H. Summerson, J.P. (Deputy Lieutenant, County of Durham—chairman and joint managing director, Summerson's Foundries, Limited), Mrs. Summerson, Mr. G. W. Ilsley (Master, the Worshipful Company of Founders), Mrs. Ilsley, Col. Sir William A. Worsley, Bt., J.P., (Lord Lieutenant, Yorkshire N.R.), Lady Worsley, Mr. C. H. Wilson (president), Mrs. Wilson, Councillor J. A. Kennedy, J.P., (Mayor of Scarborough), Mrs. Kennedy, Mr. A. E. Peace (immediate past-president) and Mrs. Peace—Dr. and Mrs. C. J. Dadswell are in the foreground.

during the current session. The first was the granting of honorary membership to Sir Frederick Scopes in recognition of distinguished services to the industry and to the Institute (Sir Frederick Scopes served as president of the Joint Iron Council, chairman of the board of governors of the National Foundry College, and as president of the British Cast Iron Research Association).

E. J. Fox Medal

The next presentation was that of the E. J. Fox medal to Dr. C. J. Dadswell, a past-president of the Institute, in recognition of his exceptional services to the Institute and the industry during his very distinguished career. In acknowledging this award Dr. Dadswell said the citation seemed to him the wrong way round in that he should be giving something to the Institute for its services to him during the past 30 years.

Meritorious Services Medal

For outstanding work for the Institute over the whole period of his 46 years membership, the award was made of the meritorious services medal to Mr. Ben Hird. Again in his acknowledgment, Mr. Hird said that for whatever he had given to the Institute he had had a four-fold return, and that this was the crowning pleasant event of his many happy years with the Institute.

British Foundry Medal and Prize

Mr. Barrington Hooper, C.B.E., representing FOUNDRY TRADE JOURNAL (the donors), was called upon to present the next award, that of the British Foundry Medal and Prize. The medal was presented to Mr. T. C. Wilson in recognition of the excellence of his paper describing the CO_2 Process at J. Blakeborough & Sons, Limited, which had been published during the period under review. Making the presentation to Mr. Wilson and of the British Foundry Prize (awarded jointly with the medal) to Mr. J. B. Hollis, co-author with Mr. Wilson, Mr. Hooper remarked jocularly that it gave him special pleasure to make the award in person, since it seemed that he was the only donor of an award of longstanding who was able to do so—all the other original donors being deceased!

John Bell Scholarship

Making this travelling scholarship award to Mr. William B. Morrison for his work during the degree course at the Royal College of Science and Technology, Glasgow, the president remarked that the occasion should be a highlight in Mr. Morrison's career, and he asked him particularly to remember the man with whose name the scholarship was associated.

Diplomas

The next item in the proceedings was the presentation of diplomas for outstanding papers presented to the Institute during the period under review. The recipients were: Mr. J. H. Osborn, Mr. T. A. Marsden and Mr. R. F. Horton for their joint paper describing a modern foundry for the manufacture of small steel castings by new moulding techniques; Mr. H. G. C. King for his paper outlining methods of patternmaking in plastics, and Mr. G. C. B. Lamb for his paper "Towards Automation" which had been the IBF sponsored paper presented to the Institute of Australian Foundrymen.

Other conference scenes: (left to right)—(left) Mrs. C. H. Wilson, wife of the new president, presenting a bouquet to Mrs. J. A. Kennedy, Mayoress of Scarborough, with Mr. Frank Shepherd (chairman, conference committee) in the background; (right) Mrs. Shotton, Mr. R. B. Whitelaw (Australia), Mr. G. R. Shotton (senior vice-president), Mr. D. A. Richards (junior vice-president), Mrs. Richards and Dr. A. B. Everest (past-president) at the banquet reception.

Election of Officers

The next item on the agenda was the formal election of officers for the 1959/60 session, during which the following were chosen (as briefly recorded also in the JOURNAL for June 11): *As president,* Mr. C. H. Wilson; *as senior vice-president,* Mr. G. R. Shotton; *and as junior vice-president,* Mr. D. A. Richards.

When he invested Mr. Wilson with the "harness" of office, the retiring president, Mr. Peace, remarked that at last someone had been found whose stature it fitted! Mr. Wilson then asked Mr. Peace to accept a past-president's badge and to remain in the chair for the rest of the meeting. Mr. Peace next had the pleasant duty of presenting the senior vice-president's badge of office to Mr. G. R. Shotton, who had been proposed by Mr. John Gardom, with Mr. P. A. Russell, seconding. In seconding the proposal by Mr. N. P. Newman that Mr. D. A. Richards be junior vice-president, Mr. John Blakiston said that Mr. Richards was a man who was "always on the job" and ready to give his services at any time. He had twice been branch president of the Bristol & West of England branch of the Institute.

Amendments to Bye-laws

On the recommendation of Mr. John Bell, past-president—who has been chairman of a sub-committee considering for the last 18 months possible revision of the membership bye-laws of the Institute—a number of changes were put to the meeting, seconded by Mr. John Bailes, and carried. In essence, these changes comprise the following:—

Bye-law 3: (a) No change in the general conditions of membership and in the status and conditions of *Honorary Members.*

(*b*) *Members.* A man between the ages of 30 and 40 is not eligible for full membership if he belongs to an industry or profession only related to the foundry industry. He must in fact be a foundryman; even if he is 35 years old he must have held a position of eminence in the foundry industry for at least five years, unless he is otherwise qualified for associate membership. If an applicant is at least 40 years of age and holds or has held for at least five years a position of eminence in an industry ancillary to the foundry industry, he can then be a *member* of the Institute.

(*c*) *Associate Members.* Here the rules for admittance to this grade have been substantially changed and the position can best be summarized by showing the old and new rules as in Table 1.

(*d*) *Associates:* Here again the position is substantially changed as is made clear by Table 2.

(*e*) *Subscribing Firms:* The position here is little changed except that the nominee of the firm to represent it in Institute matters need only be qualified as an associate member—to be duly elected as such. Previously the firm's nominee had to be qualified for full membership.

Bye-law No. 6

Bye-law No. 6, regulating the procedure under which applications for membership are to be considered, now requires that all applications after consideration of a branch Council shall be submitted with that body's recommendation to the General Council for final consideration. Previously it appeared that a branch Council had power to an application out of hand—although for l years this had never been done.

bye-law regulating subscriptions payable by

1—*Old and New Rules for IBF Associate Members*

IOUS BYE-LAWS	NEW BYE-LAWS
applicant shall the Council *either* at he is at least 21 f age and has passed ualifying examination be prescribed by the l and at the time of plication is engaged foundry industry or related or kindred y or profession, and ined one of the out- g awards connected he foundry industry, s the diploma of the te or the Buchanan medal; that he is at least 25 of age and has passed ualifying examination be prescribed by the l and at the time of plication is engaged in undry industry or in ted or kindred indus- profession and has so engaged for such nd in such capacity as ouncil may consider ary; that he is at least 27 of age and has been rly trained in some of foundry practice lds or has held a n of responsibility in dustry for a period in the opinion of the l qualifies him for te membership.	Every applicant shall satisfy the Council that he is at least 25 years of age and has passed such qualifying examination as may be prescribed by the Council and has been engaged for at least three years in some branch of the foundry industry and is so engaged at the time of his application; *or* (*b*) that he is at least 28 years of age and has been trained in some branch of the foundry industry and has held for at least three years a supervisory position in the foundry industry and is so engaged at the time of his application; *or* (*c*) that he is at least 30 years of age and has been trained in some branch of the foundry industry and has held for at least three years a supervisory position in the foundry industry and at the time of his application has been for at least five years engaged in an industry ancillary to the foundry industry and is so engaged at the time of his application; *or* (*d*) that he is at least 30 years of age and has been regularly trained for not less than four years in an industry ancillary to the foundry industry and at the time of his application has been engaged for at least five years in a supervisory technical capacity in a foundry and is so engaged at the time of his application.

Table 2—Old and New Rules for IBF Associates

PREVIOUS BYE-LAWS	NEW BYE-LAWS
Every applicant shall satisfy the Council either (*a*) that he is at least 21 years of age and an operative engaged in the foundry industry; *or* (*b*) that he is an apprentice or a person otherwise undergoing training in a foundry, patternshop, engineering establishment or metallurgical laboratory; *or* (*c*) that he is a student of foundry practice or metallurgy or engineering at a university or college or technical school recognised by the Council; *or* (*d*) that he is otherwise qualified for admission to the class of associate members but has not attained the age specified for such membership. An operative engaged in the foundry industry shall be entitled to remain in membership as an associate irrespective of age. No other person unless elected an associate prior to July 1, 1948, shall retain membership as an associate after attaining the age of 28 years	*Associates (over 23 years of age)* Every applicant shall satisfy the Council either (*a*) that he is at least 23 years of age and has been regularly trained in some branch of the foundry industry and has been engaged for at least five years in the foundry industry; *or* (*b*) that he is at least 23 years of age and has passed an examination recognized by the Council and is engaged in the foundry industry; *or* (*c*) that he is at least 25 years of age and has been regularly trained in an industry ancillary to the foundry industry and has been engaged for at least five years in a technical capacity in a foundry and is so engaged at the time of his application; *or* (*d*) that he is qualified for election to the grade or class of associate members but has not attained the age for such membership. *Associates (under 23 years of age)* (*a*) that he is an apprentice or person otherwise undergoing training in a patternshop, foundry, metallurgical laboratory or engineering establishment; *or* (*b*) that he is a student of patternmaking, foundry practice, metallurgy or engineering in a university or college or technical school recognized by the Council. No person shall return membership as an associate (under 23 years of age) after attaining the age of 23 years, unless he is undertaking a period of training of which three years have not been completed.

rence personalities (*continued*): (*from left to right*)—(*left*) *Sir Frederick Scopes delivering the rd Williams lecture;* (*right*) *Sir William A. Worsley, J.P., and Lady Worsley with the president, C. H. Wilson, and Mrs. Wilson, and the Mayor and Mayoress of Scarborough, Councillor and Mrs. Kennedy, at the banquet on the Wednesday evening.*

(*From left to right*): (*top*) *Mr. J. W. Butler (assistant director, Council of Ironfoundry Associations), Mrs. Marshall, Mr. K. Marshall (director, CFA) and Mr. H. Morrogh (director, British Cast Iron Research Association);* (*bottom*) *Mr. D. M. Moir (past-president, Birmingham branch) and Mrs. Moir with Mr. and Mrs. J. Hird.*

various grades of membership has been revised to take account of new grades as follow:

Members, associate members, associates and subscribing firms, shall pay an annual subscription according to the scale following: Member, £3 13s. 6d.; associate member, £2 12s. 6d.; associate 23 years of age or over, £2 2s.; under 23 years of age 10s. 6d.; subscribing firm, £10 10s. No subscription shall be payable by honorary secretaries of branches or sections during their tenure of office, or by a member or associate member who is the representative of a subscribing firm.

Other Changes:

To take cognisance of changes in the Institute's mode of publication of its *Proceedings* (and to avoid the supply of IBF literature to members who default in payment of subscriptions) bye-laws 11 and 34 have been slightly revised. In general a member now receives the publications of the Institute after payment of his current subscription and they are all made available to the associate grade of membership (under 23 years of age) until the Council may decide otherwise. Previously *associates* of the Institute were only entitled to the *Proceedings* on payment of an extra charge. Another proviso is that members re-elected after a lapse in membership may acquire back numbers of the *Proceedings* at their approximate cost to the Institute (always providing such copies are available, of course).

Explaining the above changes, it is clear that apart from minor modifications the alterations are concerned with increasing the status of membership. The proposed increased rate of subscription for associates (over 23 years of age)—who will henceforward represent an older group of members enjoying higher status—will ensure that this section of the membership contributes a sum more nearly approaching the cost of the services which it receives from the Institute, while the increase in the subscription of associates (under 23 years of age) is an adjustment partly to cover the decrease in the value of money since the subscription was fixed at 5s.

Council Members Elected

Following the re-election of auditors (J. & A. W. Sully & Company), the result of the ballot for five elected members of general Council was announced, those chosen being Dr. H. T. Angus, Mr. R. L. Handley, Mr. Barrington Hooper, Mr. A. Kirkham, and Mr. H. Paton Millar. These members will serve for the two-year period ending in June 1961.

In the concluding business of the annual general meeting, Mr. C. H. Wilson, the new president, proposed a vote of thanks to Mr. Peace who retired, and Mr. N. P. Newman seconded the proposition. Mr. Peace in his response coupled his appreciation of the support of members and officials with a special word of gratitude for his wife who had seconded him so ably during his year of office. He also voiced a special " thank-you " to Mr. Lambert the general secretary. Before the meeting closed Mr. Peace announced that a telegram had been despatched to His Royal Highness the Duke of Edinburgh (an honorary member of the Institute) sending him the warmest good wishes on the occasion of his birthday which happened to be on that day.

"FATHER TO SON"—TWELVE YEARS OF PROGRESS

After a break for coffee, members reassembled to hear the Presidential Address from Mr. C. H.

Initially, the president reminded members
was 12 years since his father, Mr. P. H.
, had occupied the high office in the Institute.
s took for his theme the twelve years of IBF
ss 1947 to 1959. First he quoted extracts
is father's address in 1947 and said he hoped
w he was not mistaken in his faith in the
dry " future expressed at that time. Dealing
membership, he mentioned the notable in-
of from 264 to 1,139 associates of the Insti-
the period, which represented the increase
rest of the younger generation of foundry-

ressing an opinion at this point, Mr. Wilson
e thought there was currently increased scope
foundries of the Commonwealth in the
, and work should proceed in adopting the
possible relationship with UK foundry
rs, together with more interchange between
members and those in the Commonwealth.
amples of this increasing contact he men-
last year's successful Indian Foundry Con-
and the pending voyage of Mr. E. Longden
stralia to give the first Tom Makemson
rial lecture to that branch when it celebrates
ning of age as an organization.
ling with domestic matters, Mr. Wilson re-
to the IBF conference, and the reports pre-
, as a "shop window" for UK foundry-
He also dealt briefly with the National
Visit Day annual function (acknowledging
nstitute's gratitude to the companies who
as hosts) and to the work of the Technical
il, for example, in the publication of its
-esteemed volume of "Typical Microstruc-
of Cast Metals."
ing to his main theme—education—the
ent mentioned that liaison had commenced
g ago as 1928 between the Institute and the
Guilds organization. He then quoted the
record of candidates presenting themselves
foundry practice and patternmaking exami-
s of that body, and reported successes since
saying this was impressive but not good
h. He also dealt with other educational facilities open to foundrymen in this country ending with reference to the National Foundry College where 186 diplomas had been granted, to date. (Here Mr. Wilson said that just as he thought he was the first president to follow a father who had also held that office, he also thought he was the first president to hold a diploma of the National Foundry College!) Thirty students were now taking the second part of the College course and the Governors were now considering the setting up of a further academically advanced course, but more support of a practical nature was needed from the industry.

Before concluding his remarks on education, the president mentioned also the post-graduate course instituted recently at Birmingham University, the IBF Foremen's Training Courses, the National Foundry Craft Training Centre and apprentice competitions, saying that there was a need for a joint committee of all interested bodies to inquire into training in all aspects of the foundry industry and to make recommendations for future rationalized procedure.

To close his address, Mr. Wilson said that though much had been done in these last 12 years, there was no room for complacency and the future would need the active support of all members in furthering the aims of the Institute.

In proposing a vote of thanks to Mr. Wilson for his address, Mr. Peace expressed appreciation, especially, for this new stimulus on the educational side. Dr. A. B. Everest seconded this proposition (which was carried with applause), laying stress on the desirability for increased international exchanges between foundrymen.

To conclude the morning's programme, Sir Frederick Scopes gave the Edward Williams Lecture, choosing for his subject "Thoughts on the Future of the Ironfoundry Industry" (which it is hoped to abstract in a future issue of the JOURNAL). He, too, drew attention to the National Foundry College proposals for the new high grade course, which, he said, it was hoped to start in September, 1960.

(To be continued)

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lish Electric gets US Dam Contract

$6,500,000 (£2,300,000) Big Bend dam contract
supply of hydraulic turbines for the major
Dakota project has been awarded to the English
Company, Limited. English Electric underbid
rest US domestic manufacturer—Baldwin-Lima-
on Company—by 30 per cent. The decision
ade before the Office of Civil and Defence
zation found against the domestic industry's
r a ban on imports of hydraulic turbines and
ors, transformers, and circuit breakers on the
s of national security.

award leaves the result of one other major
Electric low bid to be determined. This is
,500,000 bid for the supply of water-wheel
ors to the Barkley hydro-electric project in
ky. The Army Corps of Engineers has still to
ce a decision on the tenders which were opened
h before those for Big Bend.

British Machinery for Rumanian Tyre Factory

Rustyfa, Limited, the British consortium, has won a contract for the design and supply of machinery and equipment for a large tyre factory to be built in Rumania. The project, in which Dunlop Advisory Services, Limited, is acting as consultants, involves expenditure in the UK of more than £7,500,000. The factory will be able to produce annually 1,000,000 tyres and tubes for trucks, buses, and passenger cars, 500,000 for motor cycles and scooters, and 1,500,000 for bicycles.

Rustyfa is already supplying machinery and equipment for a large tyre factory at Dniepropetrovsk, in the USSR. The member-companies of the consortium are:—David Bridge & Company, Limited, Crompton Parkinson, Limited, Lancashire Dynamo Holdings, Limited, Mather & Platt, Limited, Francis Shaw & Company, Limited, and Simon Handling Engineers, Limited.

Equipment & Supplies

Mould Dryer

A new type of gas-fired hot-air unit (the Axialjet-M), for drying moulds *in situ*, has been introduced by Modern Furnaces & Stoves, Limited, Booth Street, Handsworth, Birmingham, 21, who are manufacturing them under licence from the North Western Gas Board. The unit (Fig. 1) has fully-automatic spark ignition, electric-failure protection and push-button control. Its total weight, including the axial fan, is 140 lb., which makes it useful in foundries when no crane is available, since it can be easily carried by two men. The unit operates equally well in both vertical and horizontal planes—the maximum heat output is instantaneously available, and the temperature of the discharged hot gases readily controlled. In operation, the casing (with the exception of the nozzle) is kept cool by a fan blowing cold air through the annular space between the combustion chamber and the outer casing. The unit is able to deliver 400 cub. ft. of hot air per min. at temperatures up to 400 deg. C., and maximum gas consumption is 400,000 B.T.U's per hr. (approximately 850 cub. ft. of town's gas).

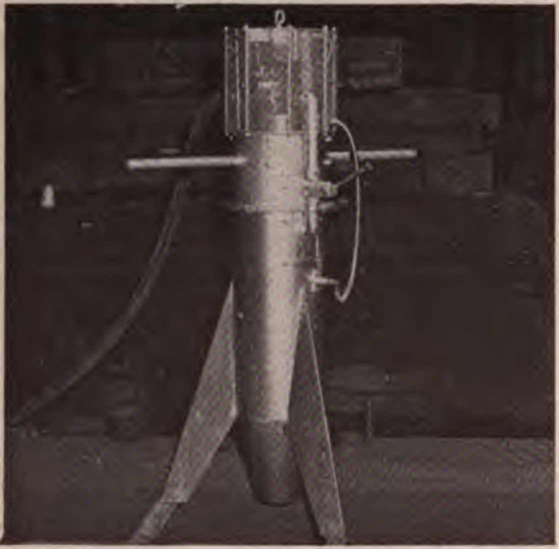
Ultrasonic Flaw-detector

In the ultrasonic non-destructive inspection field, Ultrasonoscope Company (London), Limited, Sudbourne Road, Brixton Hill, London, S.W.2, have added a new model (the Mark 2) to their range of flaw-detectors.

This portable general-purpose flaw-detector (Fig. 1) is claimed to have fast time-base speeds and high trace brightness, combined with a rectified or unrectified trace display to enable a comprehensive study of flaw echo shape.

Its operational frequency range of ½ to 10 mc/s, and maximum depth range of 20 ft. (in steel), extends the possible application range over a very wide number of non-destructive inspection problems. A few of the many applications in the engineering, marine, welding and nuclear energy fields include: the testing of lead shielding blocks; graphite quality control; heavy-section weld inspection, and the checking of steel plate for lamination.

Fig. 1.—*Gas-fired hot-air unit for drying moulds, introduced by Modern Furnace & Stoves, Limited, of Birmingham.*



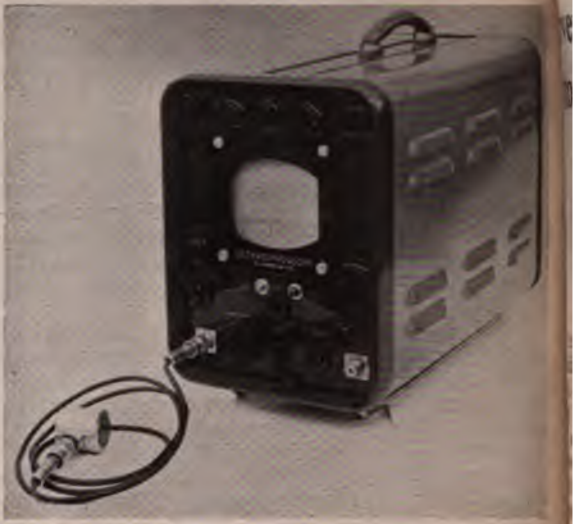


Fig. 2.—*Ultrasonic flaw-detector developed by Ultrasonoscope Company (London), Limited, of London, S.W.2.*

Principles of Operation

The Mark 2 instrument makes use of the principle of echo sounding, using vibrations beyond the sonic range. These vibrations are produced by a barium titanate or lead zirconate transducer, designed to operate most efficiently at one frequency, mounted in a probe which varies according to the type of application. On single-probe working the same transducer both transmits the vibration and receives the echo, converting the echo back into an electrical impulse.

A 5-in. dia. cathode ray tube shows the condition of the material being tested, a reflected wave giving a vertical deflection on the cathode ray tube—the distance that this wave has travelled is indicated by the horizontal position of the deflection along the time base. The speed of travel of the time base is continuously variable by means of a coarse and fine control, so that its total length may be made to correspond to echo distances of from 1 in. to 20 ft. A device is incorporated to enable the operator to select any portion of the display and expand it across the full time-base length. Optional "B" Scan presentation is available at the turn of a switch.

Specification

Specification summary is as follows: frequency range, ½ to 10 mc/s; time-base range, 1 in. to 20 ft. (in steel); dimensions, 9¾ by 17½ by 13 in.; weight, 38 lb.; electrical supply, 110 to 250 v., 50∞, and consumption, 120 w.

E. Elliott, Limited, 315, Summer Lane, Birmingham, 19, announce three new types of safety goggles. These goggles incorporate "Celastoid" windows, which are claimed to be tough, crystal clear, shatterproof and splinterproof.

vey of the Hallsworth ;omatic Moulding System*

By H. B. Hallsworth, R. D. Mills and Peter Spear

This survey describes a new approach to an old industrial problem—that of producing medium or large quantities of accurate ferrous and non-ferrous sand-castings of a size that may be accommodated without difficulty in an assembly moulding box of dimensions 12 by 9 by 5 in.

e Hallsworth automatic moulding system ling box with dimensions 12 by 9 by 5 in.

In the conventional foundry it is usual a larger box than this, moulded by hand ossibly, machine squeezing and stripping d by hand assembly and pouring under ıal foundry conditions, which have not l, apart from the health aspect, in many . Most of the improved methods in Euro- actice, especially in the production of light , appear to be simple extensions of known ional methods. According to Timmins[1] ly speaking, the two root causes of in- ies in the moulding department are, first, or limitations of floor space, and secondly, t that moulders are often called upon to ut subsidiary duties of pouring, knocking l sand conditioning. . . ."

Hallsworth system employs the principle relatively small, easily handled, moulding ith completely automatic equipment as and necessary, but still retaining the human ele- justified by economics. At the same time tem is flexible, to facilitate the use of a of patternplates within a single shift with- more adjustments than can be undertaken emi-skilled mechanic. The arrangement is on an automatic moulding-machine, which tically sprays, charges with sand, "edge squeezes, removes surplus sand, strips and s the mould on to a conveyor track ready embly. This entire sequence is carried out our-station machine served by a number of y appliances keyed to its operational e. A general view of the machine is given 1. The moulding table rotates between the d head castings which in principle, from the ral viewpoint, present a self-contained force

UTOMATIC MOULDING MACHINE

Sequence of Operations

1

machine consists of four stations, and a table which automatically conveys the half-box and pattern from station to station. At the first station the operator, after locating the box part on the patternplate, pulls down the vertically-positioned hinged sand-allowance frame on to the box part.

Station 2

The table indexes to station 2 to receive sand, and, in its arc of movement, is subjected to a spray of parting fluid. A semi-rotary hopper turns through 180 deg., discharging sand into the box part mounted on the table. A frame fitted to the sand chute then moves downwards compressing the sand round the edge of the mould (*i.e.*, "edge tucks").

Station 3

The table then indexes to station 3 for the main squeeze operation. During this movement the sand-filled box part passes under an adjustable sand-levelling device, which strikes off surplus sand (*i.e.*, the "static strickle bar").

Station 4

Following the main squeezing operation the table indexes to station 4. During the movement from station 3 to station 4 the hinged sand-allowance frame is restored to the vertical position to enable the scraper bar to strickle the mould. The patternplate is vibrated, and the mould stripped to be received by the take-off arms, which have by now moved into position.

Completion of Cycle

The cycle is completed when the take-off mechanism places the half mould face upwards on to a moving belt conveyor. It will be appreciated that all the operations described take place simultaneously, and that four boxes and patterns are in use simultaneously.

Functions of Operator

It is necessary for an operator to be present, but his sole functions are to: (1) Visually examine the patternplate, and clean it with a compressed-air gun if necessary; (2) position the box part, and (3) bring down the sand-allowance frame. None of these operations is fatiguing to any great extent, and all the essential moulding operations are carried out automatically.

Operation and Control

Basic Principles

The basic principle is to use the table indexing mechanism as the master control, steering the

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rt description of this system was given in the April 26, ıe of the JOURNAL.

Hallsworth is development director of Platt Malleable . Limited, and was formerly manager of the foundry nt department at Rubery Owen & Company, Limited. is is the present manager of this department, and ar is director of research.

Hallsworth Automatic Moulding System

operating cycle and thus ensuring that no overlapping of operations can occur. Concise control of operation speed is obtained, where necessary, by mechanically linking a hydraulic dashpot system to a pneumatic power system. Motive power for table rotation is supplied by a pneumatic cylinder, its speed being controlled by a hydraulic cylinder. Overall cycle time is controlled electrically by process timers. Individual cylinder speed is controlled pneumatically by speed-control valves.

Movement

Motion is transferred from the index cylinder to the rotary table by a pawl and indexing cam. The pawl is mounted in a carrier which oscillates around the indexing cam, thus imparting the necessary interrupted rotary motion. Movement is under the control of a hydraulic cylinder, thus ensuring that starting and stopping of the table is reasonably shockless. During the power stroke of the index cylinder the pawl is in the engaged position, so that motion is carried directly from the cylinder to the machine table *via* a pair of indexing plates and a vertical shaft. The shaft is mounted in top and bottom bearings, and has the pattern table keyed to it. Adjustable cams are attached to the indexing plates, which control in sequence the primary ancillary operations which are performed when the table is in motion. The operations which are undertaken when the table is still are under the direct contr a pilot valve, which is actuated from a cam tioned on the mould take-off arms.

Emergency Stop Control

An emergency foot-operated solenoid stop trol is fitted externally to the base casting. pression of the control cuts off the supply of the machine and unloads all cylinders, thus bri all motion to a standstill. As the corollar this the indexing mechanism has no load, an table may be moved freely by hand.

Sand-allowance Frame

Also fitted to the table driving shaft i assembly of four hinged frames, so sprung that occupy either vertical or horizontal positions. frames are vertical during loading and unloa and horizontal when "edge tucking" and sq ing. At the end of the cycle of mould produ the frame is vertical, and one of the oper functions after placing a new moulding box in tion is to lower the frame, where it is held horizontally by over-centred springs. Betwee

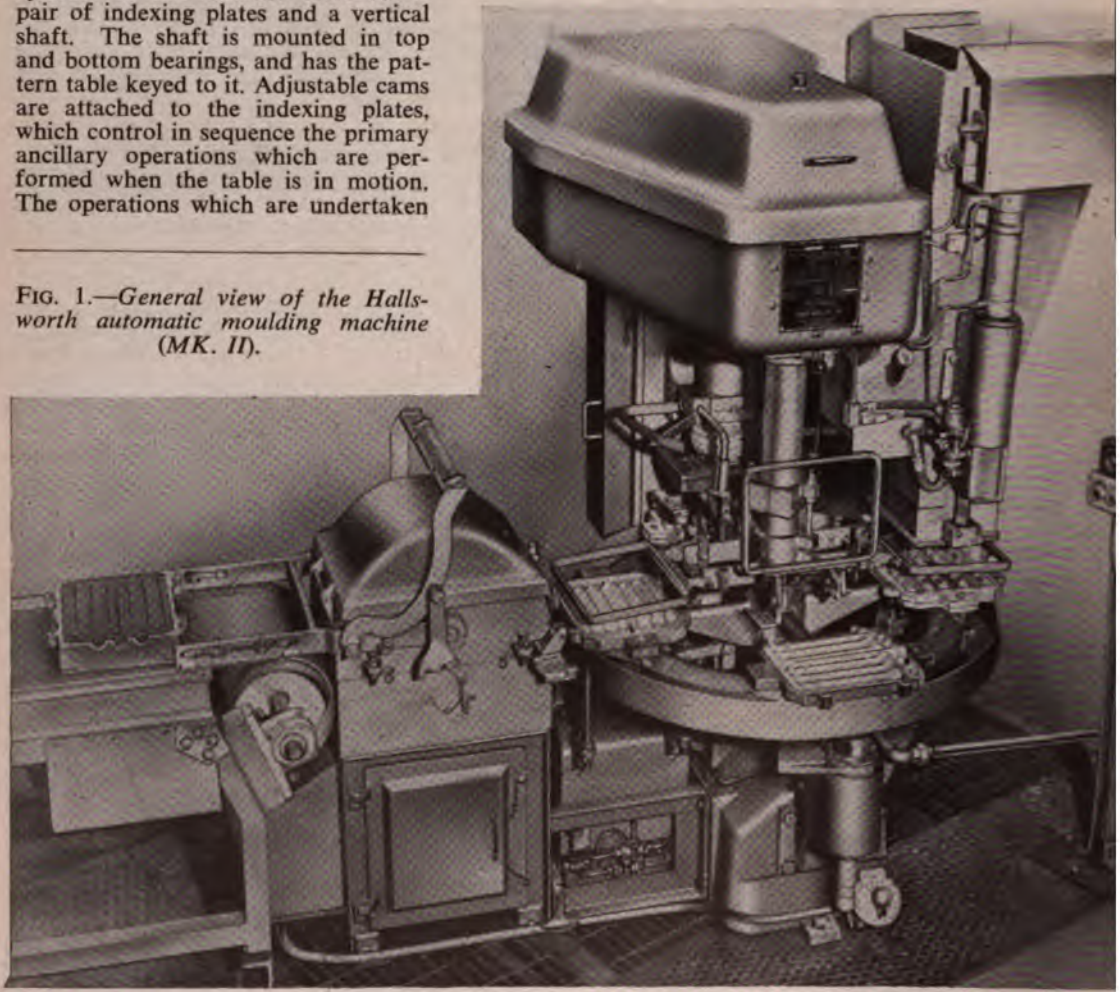


FIG. 1.—*General view of the Hallsworth automatic moulding machine (MK. II).*

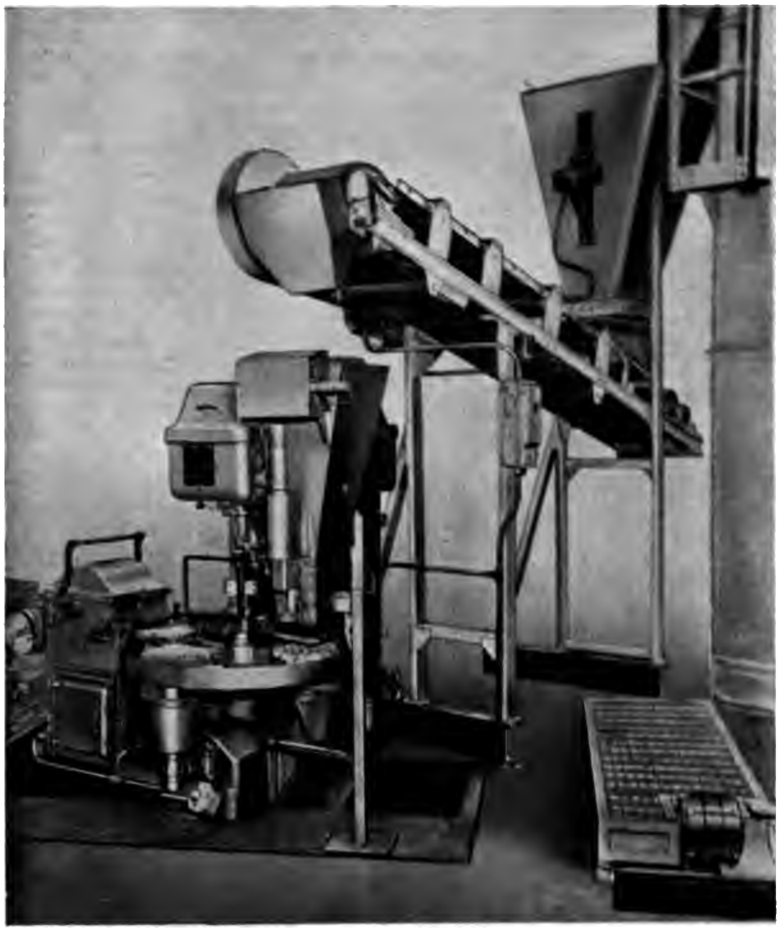


FIG. 2.—*Moulding machine and sand feed conveyor. The moulding-machine sand-chute is immediately below the sand feed conveyor. In the right-hand corner of the photograph the magnetic separator guard can be seen.*

squeezing and mould-ejection stations (3 and 4) a projection at the back of the frame passes under a positioned wheel, which forces the frame into the vertical position. The purpose of the frame is to contain surplus sand for ramming requirements, and to prevent spillage during these operations.

Sand-metering and "Edge Tucking"

A steel chute is fitted to the moulding machine (see Fig. 2). At the top of this chute is mounted a double-sided hopper, which can be seen in detail in Fig. 3. This hopper consists of two opposed box-like compartments, one of which is always in a position to receive sand from the sand belt-conveyor working with the reservoir hopper (shown in Fig. 2). The double-sided semi-rotary hopper is mounted horizontally on two male bearings attached to a square shaft. At each indexed operation the hopper turns through 180 deg. in a clockwise or anti-clockwise direction, emptying the sand-filled compartment. The amount of sand entering the hopper between two indexing operations is controlled by adjustment of the gate on the reservoir hopper, which controls the level of sand on the belt. The steel chute is fitted with a movable frame at its discharge outlet. This frame has four "keep" sides, the leading edges of which are flanged to squeeze the sand at the edge of the moulding box and thus perform the function of "edge tucking." Vertical movement of the "edge tucking" frame is effected by two double-acting pneumatic cylinders. The overall dimensions of the frame provide a working clearance between the mould and the frame, thus enabling the squeezing force to go into the body of the sand.

Main Squeeze

The main squeeze cylinder is accommodated within the head casting, and operates vertically. The piston rod carries a serrated press-plate of suitable dimensions to allow entry into the sand frame when squeezing. In order to accommodate the heavy thrust which takes place a pair of pads are positioned on the underside of the table, designed to contact on a pair of tapered support-rollers fitted to the base casting when a load is being applied, thus stopping table deflection and limiting main bearing wear. Any variation of pressure required can be obtained by adjustment of an easily accessible pressure-control on the air-line.

Mould Stripping

The lifting mechanism consists of an aluminium casting, on which are mounted four ejector pins positioned to locate at the corners of the box. Vertical movement of the unit is obtained by a specially designed heavy-duty air-cylinder, to which two steadying hydraulic cylinders are coupled mechanically. The mounting structure is a bracket cantilevered from the base casting. Before the four pins are in contact with the box, a standard pneumatic vibrator comes into action on the underside of the patternplate and continues during lifting, thus preventing sand sticking to the pattern and facilitating a clean stripping action.

Mould Take-off

The mould take-off (see Fig. 4) consists of two steel lifting-arms, semi-rotatably mounted in well-aligning roller-bearings, located on a steel frame. The arms are actuated by two trunnion-mounted cylinders, positioned in parallel—an air cylinder to supply motive power, and a hydraulic cylinder to control speed. The linear motion of the cylinders is transposed to angular movement by a rocker arm connected to the cylinder nose ends. The two lifting arms are fitted with spring-loaded catches, which engage corresponding projections on the moulding box. This method of attachment prevents any movement of the half mould relative to the arms, during its transfer from the machine to the coring conveyor, and yet allows it to be withdrawn smoothly by the conveyor.

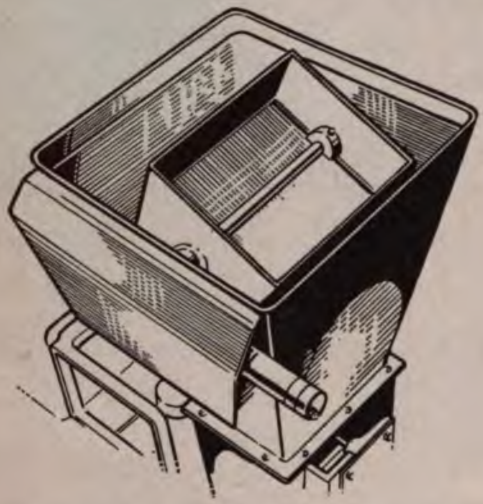


FIG. 3.—*Detailed view of the sand-metering hopper which is fitted to the moulding machine.*

Scraper

The scraper mechanism has been designed to reproduce mechanically what is normally a hand operation. During this operation, either by hand or by machine, excess sand is removed from the mould back by the cutting action of the scraper bar or blade. It is essential that, after the scraping operation, the level of sand should not protrude above the top edge of the moulding box. A frame is fitted over, and pivoted to, the mould take-off lifting-arms. In the moulding-box discharge position the scraper rests on stops, with the leading edge facing towards station 4. A special adjustable steel cutting blade is attached to the leading edge of the frame. Rollers are set flush either side of this scraper blade, designed to run along the opposing faces of the moulding-box sides. When the take-off arms move to engage a mould they are preceded by the scraper frame, and the semi-rotary movement of the arms is converted into a linear movement of the scraper frame. Thus the scraper blade passes across the moulding box cutting away excess sand (see Fig. 5).

MOULD CONVEYOR

Mould Loading

To ensure efficient labour utilization, and for inspection purposes, the completed mould is loaded manually into the rotary conveyor shown in Fig. 6. The operator effort needed is slight, since a slip is provided at the end of the coring conveyor, down which the boxes slide into the next pallet. From this point the mould is handled mechanically.

Mould Clamping

The mould-clamping mechanisms or pallets are carried on the outer ring of the rotary track. Each unit consists of a base with a spring-loaded top, and is mounted in pivots about the bottom pallet between two specially designed upright supports. In each pair of pivot members two links are fitted loosely, one each side of the mechanism, and connected together with a steel bar which projects a short distance through each link. This bar is provided with a pressure roller in the centre. A roller is fitted to the underside of the mechanism which engages with a cam rail controlling the angle of tilt. When the mechanism is tilted

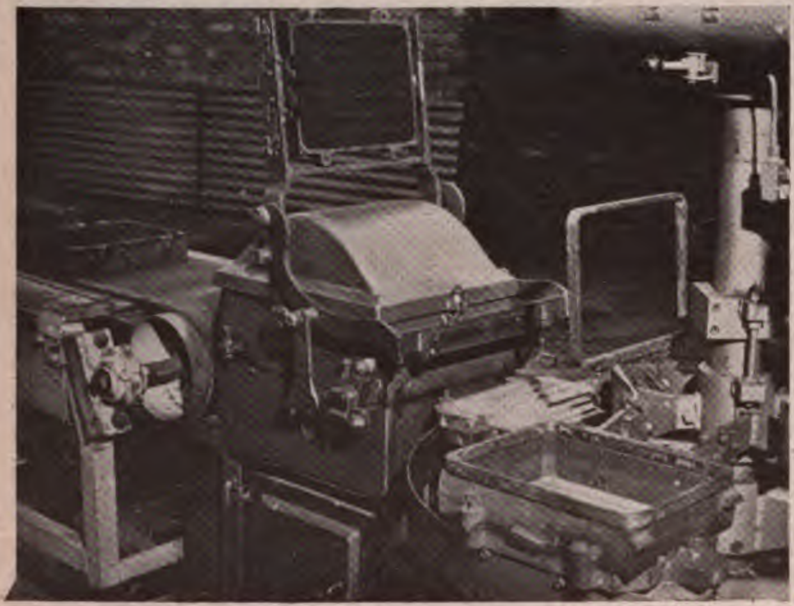


FIG. 4.—*View of the mould take-off station. The half mould has engaged in the take-off arms and is being transported towards the coring conveyor.*

clamping is effected by the projecting ends of the link tie-bar interfering with the top of the two vertical supports, causing the pressure roller to force the top plate downwards on to the mould. When the mechanism is restored to the horizontal position, again by the control of the roller engaging with the cam rail, the clamping pressure is relieved, which enables the springs to exert an upward thrust to the top plate and so facilitate the removal of the mould. The pallet mechanism is so designed that any unevenness of the sand face does not interfere with the ultimate contact of both box parts, and the mechanism is aligned essentially about the major pouring-axis of the box. The clamping arrangements have been designed to resist any ferrostatic pressure likely to be encountered, and thus prevent any possibility of metal leakage.

POURING AND SHAKE-OUT

To pour the moulds in the vertical position, it is advisable that the ladle lip be kept as close as possible to the "downgate," and the ladle height adjusted about its lip during the pouring of the metal. It is also essential, bearing in mind the method of approach to the design of the system, that the heavy fatigue associated with this operation be eliminated. Consequently the simple mechanism seen in Fig. 6 has been evolved.

Swinging-arm Ladle Support

Standard foundry ladles are used but the carrying handle is modified. The ladle and carrying handle are supported in a self-adjusting cradle suspended from a swinging arm, so that in plan the ladle moves around an arc, the centre of which coincides with the centre of the rotary track. The cradle consists of two hooks, and is supported by a compression spring working in a housing which, in addition to catering for the rotary and vertical movements, also allows the ladle to be moved inwards or outwards as desired. The arm from which the mechanism is suspended rotates about the centre of the mould conveyor, and has a balance weight fitted at the opposite end to facilitate rotation and eliminate operator fatigue. The ladle handle is provided with two trunnions, one on each side of the ladle, which pivot within the two hooks of the cradle. The cradle support spring is loaded to equal the combined weight of the cradle handle assembly, and consequently it adjusts its height as the metal poured reduces the total weight of the assembly.

Solidification of the Castings

Following the casting of the mould, the track continues to take the pallet round with no change in angle. During this period the cast metal is solidifying, and steps have been taken to ensure that no vibration occurs. The speed of the track has to be controlled to enable the casting to solidify completely, and this in turn controls the whole clamping, pouring and shake-out cycle. The track is wire-rope driven from a variable-speed gearbox and electric motor. After the necessary cooling period the poured moulds are automatically restored to the horizontal position, and unclamped ready for removal at the shake-out.

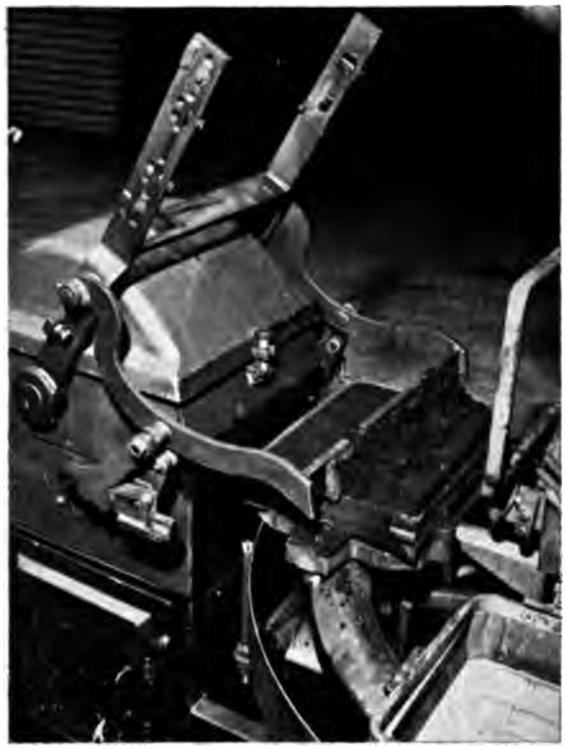


FIG. 5.—*The scraper frame of the moulding machine is seen cutting away surplus sand from the mould. Upon completion of its stroke the mould lift operates, and the take-off arms engage on the mould.*

Shake-out

The shake-out is a conventional vibratory frame-type machine fixed to the foundry floor and positioned over an underground sand-return conveyor. The box parts are placed on the gravity roller conveyor and return to the moulding machine to complete the cycle.

ECONOMICS

Production Rate

The moulding machine described in this article is capable of producing at least 240 completed moulds per hr. The speed of the circular clamping-and-pouring conveyor track is variable to give a cooling period of from 4 to 8 min., depending on the output from the moulding machine, the type of alloy, and size of the castings. There are instances, however, where it is possible to reduce the cooling period considerably, for example where very small light castings are being produced.

Difficulties of Comparison

A foundryman considering the replacement of manual or semi-mechanized methods by a unit of this type would naturally use the results obtained in his own foundry as a basis of comparison. In general terms, smaller foundries find it difficult to obtain an accurate cost assessment, as manual moulding includes several ancillary operations, the performance of which may be carried out in some instances by several operators and in other circumstances by the moulder himself. Such operations include the supply and preparation of sand, positioning of cores, box collection, metal pouring and knock-out of casting, etc. For this reason, a direct comparison of the two methods is difficult, as any cost figures chosen for manual operation would not cover all cases likely to be encountered.

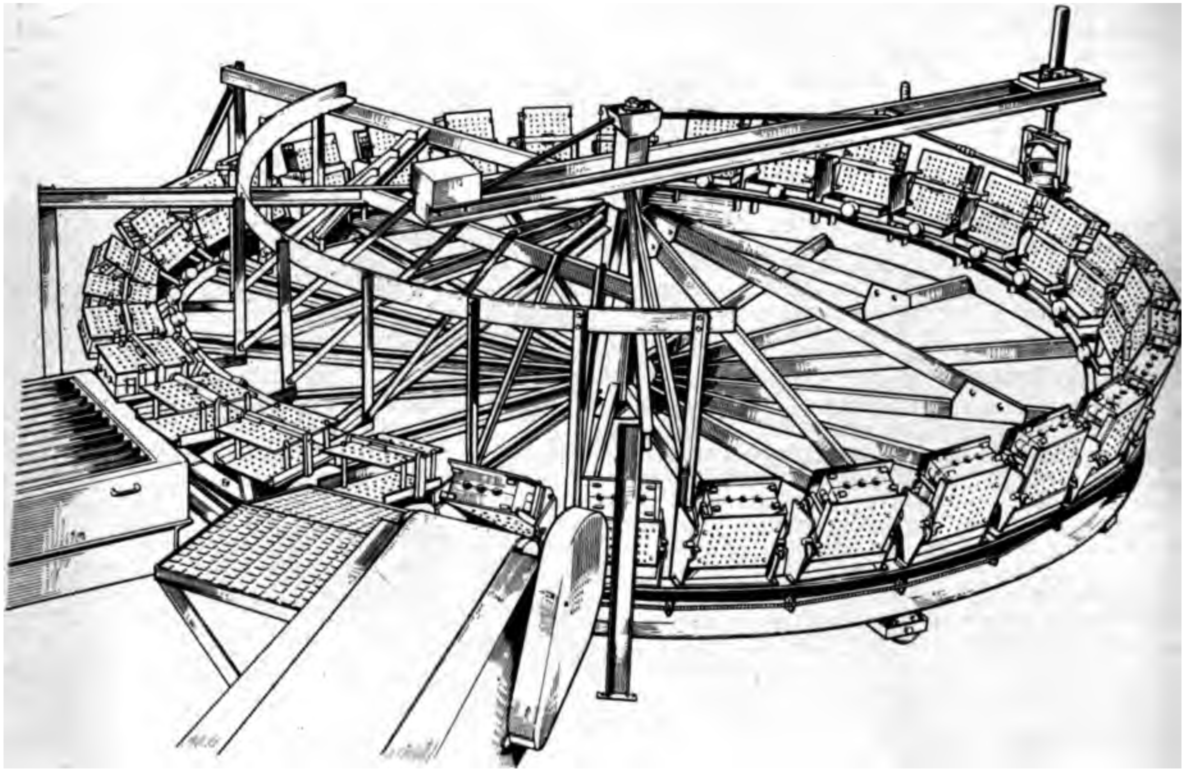


FIG. 6.—*View of the rotary casting conveyor in the Hallsworth system, showing the various positions of the mould pallets at different points on the circumference.*

Potentialities of the Unit

Some idea of the potentialities of the unit may be obtained by considering that, with a five-man team operating the unit, a rate of at least 240 completed moulds per hr. may be obtained with an output per man per day of the order of, say, 1,000 lb. This is a tentative figure assuming that fairly light castings of the order of 2½ lb. per box are being produced. (In a number of cases on working installations the casting yield per box has been as high as 8 lb., this excluding, of course, the weight of the running system.)

Drawbacks of Manual Moulding

In terms of manual operation, using a box holding 5 lb. of castings (this normally implies a larger box than used on the automatic machine—say 18 by 12 by 5 in.—which represents conventional practice), one operator would have to produce 200 boxes per day in order to approach the conservative estimate of the output of the automatic machine. In addition he would have to carry out the attendant operations himself, including sand preparation, metal pouring and all material movement. A rate of production of this order is almost impossible, and even taking into account the variation from foundry to foundry, it might be deduced that the production per operator increases three to four times when using a unit of this type. The economic benefit of even trebling the output per man under present conditions of high labour charges, and the difficulty of obtaining skilled men, needs no emphasis and gives some idea of the rapidity with which the initial capital outlay might be recovered.

CONCLUSIONS

(1) An attempt has been made to solve the problem of economic use of labour by:—

(*a*) The replacement of operations involving a high degree of operator fatigue by mechanization;

(*b*) the combination of hand-loading of empty boxes with supervision on an automatic moulding machine, and

(c) the combination of mould inspection, coring up, closing-over and loading on an automatic rotary mould-conveyor.

(2) The problem of expanding a moulding machine into a closely integrated moulding system has been overcome by using the optimum amount of mechanization on each element of the three major cycles of box, sand and metal. These cycles are closely interlocked by means of appropriate conveyors.

(3) The problem of synchronizing the various steps involved in mould preparation has been solved on the moulding machine by the use of the self-locking indexing mechanism, and the sequence timing of each operation from a master control.

(4) The problems of handling moulds prior to casting, setting up, clamping for pouring, and extraction of finished castings, have been solved by the use of the rotary mould conveyor.

(5) The need for high efficiency in the mechanical and manual handling of moulding boxes has been achieved by the use of a small, fast-moving box.

(6) Flexibility has been achieved in that, whilst the system is complete in itself, the basic units of moulding machine and rotary conveyor can be served by an outside sand and metal supply, where such capacity is already in existence.

REFERENCE

[1] Timmins, A. A. "Suggestions for Simplification in Foundry Operations." BCIRA *Journal*, October, 1954, pp. 441-446.

Metallurgical Abstract

Centrifugal Castings. J. L. EVERHART. ("Materials in Design Engineering." 1958. Vol. 48; No. 2; pp. 89-93). The nature of the centrifugal-casting process assures a dense homogeneous-cast structure free from porosity. As the metal solidifies in a spinning mould under centrifugal force, the metal tends to be forced against the mould wall while impurities are forced toward the inside of the tube.

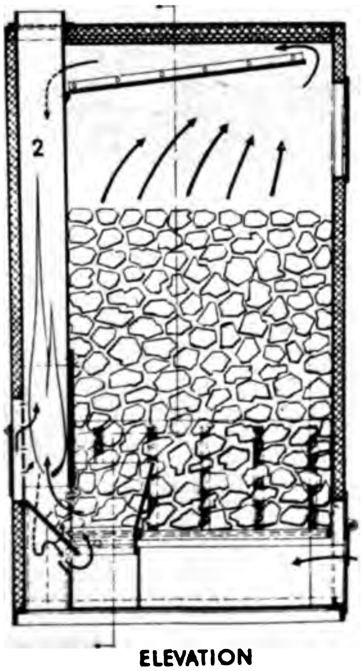
Regardless of alloy content, the tensile properties of irons cast centrifugally are reported to be higher than those of static castings produced from the same heat. The relatively low pouring temperatures and good fluidity of the common grades of grey iron make them readily adaptable to the process. Centrifugal castings are produced from carbon steels having carbon contents ranging from 0.05 to 0.90 per cent. Most of the AISI stainless and heat-resisting grades can be cast centrifugally. An advantage of the process is its use in producing tubes and cylinders from alloy compositions that are difficult to pierce and to forge or roll.

The excellent ductility resulting in the stainless-steel alloys from centrifugal casting makes it possible to reduce the rough-cast tubes to smaller-diameter tubing by hot or cold-working methods. With stainless-steel compositions, tubing over 8 in. dia. is competitive with forged and rolled tubing, but the small-diameter tubing is more expensive. Centrifugal castings with one metal on the outside and another on the inside are in commercial production.

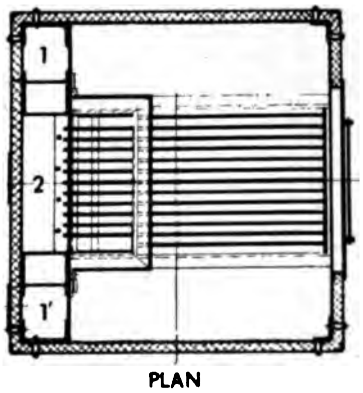
Escombe System Applied to Domestic Heating

The Escombe system (economic smokeless combustion) was invented by Mr. Sven Wernheim, one of the two designers of the original Aga cooker. The system was recently demonstrated to the Press at the Training Centre of the Coal Utilisation Council, using enclosed stoves made by the Hammond Lane Company, of Dublin. One stove was burning bituminous coal, and certainly operated smokelessly, whilst a second one was available for the inspection of the internal system of flues. The accompanying illustration shows how the primary products of combustion are passed back through the incandescent bed of fuel and reduced to combustible gases (carbon dioxide and hydrogen), which are in turn burned in a built-in gas-combustion chamber.

It should be understood that the firm, Licentia Ekeman & Brundin, Karlavagen 29, Stockholm O, Sweden, holders of the rights, do not intend to manufacture in UK, but to issue licences to makers of similar products.



ELEVATION



PLAN

The gases evolved during the primary combustion (carbon dioxide, carbon monoxide, steam and small carbon particles, etc.) which in conventional ovens are carried away through the chimney, are in this new system driven back down through the two return channels (1 and 1') at the rear wall of the oven, and are compelled to pass through the glowing fuel mass. In this way they are reduced to combustible gases (carbon monoxide and hydrogen), which in turn are burned in the oven's built-in gas combustion channel (2), where secondary air is added. Thus the system ensures complete and smokeless combustion.

Commonwealth Standards Conference

Seven countries, Australia, India, New Zealand, Pakistan, South Africa, Canada and the UK will be represented at the fourth Commonwealth Standards Conference to be held this year in Ottawa, Canada, from August 26 to September 4. An observer from the Institute for Research and Standards in Dublin will also be present. The conference will include a general session and three main technical sessions on steel, air receivers and cranes.

Amongst the subjects to be considered at the general session is certification marking, with particular reference to the principles of quality control to be included in standards and the schemes of supervision related to certification marks. Discussion of the problems of inch and metric dimensions in standards will be particularly concerned with India's position *vis-a-vis* the rest of the Commonwealth, with conversion between the inch and metric systems, and the showing of equivalents in Commonwealth standards.

Reports on a number of aspects of the British Standards Institution's work such as modular co-ordination and consumer goods activities will also be discussed. Progress reports on the technical subjects considered at the last Commonwealth conference at Delhi in 1957 (safety of domestic electrical appliances, cables and electrical equipment of machine tools) will be presented and future work in these fields as well as for new projects will be planned. The BSI team for this general session will be led by its director, Mr. H. A. R. Binney.

Technical Sessions

Discussion at the technical session on steel will include the co-ordination and rationalization of carbon-alloy and special steels. The delegates from this country to this session will be led by Mr. E. W. Senior (British Iron and Steel Federation) and will comprise Mr. W. Gillies (Lanarkshire Steel Company, Limited), Mr. W. L. Hewlett (Iron and Steel Board) and Mr. S. Richards (Appleby-Frodingham Steel Company).

At the other two technical sessions, three main types of air receiver will be considered—welded steel, pressure containers for paint, and solid drawn steel. Five British Standards have been tabled by BSI for use as a basis for the discussions. At the session on cranes, methods of expressing load ratings and the alignment of stability requirements, together with methods of calculating stresses will be the principal topics. The use, safety requirements and construction of cranes will also be reviewed.

At the former session the UK delegation will comprise Mr. H. Entwistle (H.M. Factory Inspectorate, Ministry of Labour and National Service), Mr. F. S. Marsh and Mr. C. Twigg (Chesterfield Tube Company, Limited), Dr. E. Fuchs (Imperial Chemical Industries, Limited), Mr. R. J. S. MacPherson (Association Offices Technical Committee) and Mr. P. C. Bevis (British Compressed Air Society). Mr. J. Baker (Clyde Crane and Booth, Limited), Mr. W. Reside (Sir William Arrol & Company, Limited), Mr. H. Entwistle and Mr. R. J. S. MacPherson will be present for the discussions on cranes.

LOBNITZ & COMPANY, LIMITED, Renfrew, have received an order for a dredger from the British Transport Commission valued at £250,000.

"Oversea Service"

"Oversea Service" is the title of a non-profit-
company, whose basic activity is to instruct
prior to their taking jobs overseas, especially
and the Far East, as to the conditions they will
ter and the behaviour expected of them durin
stay abroad. Most of the courses are held at
Park College, Farnham, Surrey—the headquar
Oversea Service—and others are held at D
College, Midhurst, Sussex. The courses usually
week and students are encouraged to take thei
or fiancées with them. The Board of Govern
the Advisory Council is constituted of clerics,
trialists, and members of the House of Lords. S
are drawn from the Civil Service, banks, an
industrial concerns, and, since the inception
organization in 1953, 1,376 have taken course

The writer deems the system to be admirabl
his knowledge, there is more than one case on
where at considerable expense a man has bee
abroad to take up an appointment, and he has
the foundry for but a single day; then, finding
tions intolerable, he has returned home almost
diately. If by the sponsoring firm spendin
25 guineas for a week's course, this kind of ha
can be prevented, the work of "Oversea S
merits support.

In the case of the foundry industry whe
abroad are concerned, it is usually a question
individual answering an advertisement and ac
an appointment. In such event it is suggest
before entering the countries covered by these
the applicant should ask the employer to pay
attendance at one of these courses of study i
to have at least a background knowledge of t
environment. The aim of the Service is that
going abroad should be "ambassadors" of
Christian culture.

Russian Production in Heavy Indu

According to the Central Statistical Board
USSR Council of Ministers, the country's heavy
tries have overfulfilled the production plan for
six months of 1959 of many major items.
increases over the first half of 1958 are: p
1,715,000 tons; steel, 2,345,000 tons; and rolled
1,670,000 tons. In the first half of 1959, Soviet i
produced 21,000,000 tons of pig-iron, 29,300,0
of steel, 23,100,000 tons of rolled metal, 2.
tons of steel tubes, 46,300,000 tons of iron ore,
tons of metallurgical equipment, 73,100 metal
machine-tools, 241,500 motor vehicles, 106,000 t
and 26,400 grain harvester combines.

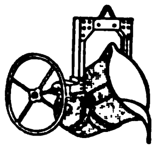
During the period under review, the following
were put into service: an open-hearth furnace
large-section rolling mill at the Nizhny Tag
Works (Urals), an open-hearth furnace and a bl
mill at the Cherepovets Steel Works (north-wes
Russian Federation), a rolling mill at the Dz
Works at Dnieprodzerjinsk (Ukraine), and a s
mill, the biggest of its kind in the USSR an
claimed, in Europe, at the Magnitogorsk Steel
(Urals).

Electrical Engineers' Exhibition

The ninth Electrical Engineers' Exhibition, sp
by the Association of Supervising Electrical En
will be held at Earls Court, London, from
to 9, 1960. The organizers are Electrical E
A.S.E.E. Exhibition, Limited, Museum House,
Street, London, W.C.1.

hibition Aftermath

(*Continued from page* 9)



ightmare and Reality "—An Old Stager's Views . . .

. . . *by* " *Jacques* "

To an old "stager" with fifty-odd years of practical and executive foundry experience behind him, a leisurely two-day visit to the Foundry Exhibition at Birmingham brought home most forcibly the mechanical genius embodied in the amazing developments in foundry plant and equipment, portable units, etc., in the last few decades. Many of these innovations would have been impossible to visualize years ago, before foundrymen, engineers and scientists discovered what a vast field for improvement lay—in a manner of speaking—just on their doorstep

superlative quality of the " live " exhibits
Foundry Exhibition in Bingley Hall, Birm-
n, removed at once the old tag about the
ry being the " Cinderella " of the engineering
ry. The machinery and plant, generally,
quality and standard of finish incredibly high
e heavy duty to be met with in use. Much
e mould-making equipment was naturally
ated with the smaller and medium-size produc-
nd limited by economics and quantities likely
required. Not that the heavy side was
ted; far from it, there were power machines
mming the deepest and largest pit and box
s. Portable sand-mixers and " whizzers " were
w, which well remove from the job the endless
navvying previously associated with the
ation of large moulds.

A " Nightmare " Return

er a preliminary look round at the main
—advisedly marked-off beforehand in the
us exhibition catalogue—the writer found an
hair at that popular rendezvous for many
as and other visitors, namely, the FOUNDRY
JOURNAL's stand. Having previously en-
a session of generous " hospitality " of the
hich was available *gratis* almost anywhere in
all, he promptly passed into the " arms of
heus," and went on a dream visit to an
nary foundry exhibition held about the year
a.d.

at was there then to show for foundry practice
a few stalls! Number one was a sand-mixing
gement, then standard for most moulding
. Here a moulder took his own floor sand,
plenty of new sand and, with a liberal use
bucket and bosh, he threw in some " nutty
" and ground the mixture when it reached
rn to use the ex-building-site mortar mill.
ability and bond were unheard of, and the
t on sand was expressed as " strong " or
en "—mostly rotten.

" Men of the Moment "

ther down in this nightmare exhibition of 50-odd years ago was a typical demonstration floor (inspired no doubt by the CFA stand at Bingley Hall). It was staffed by two moulders dressed in " period " wear, complete with ex-Sunday-go-to-meeting bowler-hats (on occasion used as receptacles for sprigs, chaplets and for other purposes unnamed!), and thick fustian (moleskin) trousers. Floor moulders of that period (otherwise known as " grave-diggers ") invariably had " yorks " tied just below their patellas, to permit easy bending. Bell-bottoms and button-up boots were very fashionable then for hardworking men. A shoveller who was naturally left-handed was a jewel of a mate for a moulder to have. With such a pair in tandem, tons of sand were tossed up and down the floor in good time; by working in harmony, and using a return feather-stroke of the underside of the shovel, lumps were smoothed out and the burnt silt mixed in all in one continuous operation. Dust and its minions (or microns), were not considered such a menace to health in those days, as the majority of foundrymen grew their own dust filter in the form of a thick walrus moustache—at the end of the day this used to have a texture like the bowler!

Materials and Plant

Still in this dream world, the writer saw on the next stand a display of materials in common use at that time. There were sample buckets of " lousy " cowhair and strawless manure (said to be from shire geldings, and " just the job for special loam mixtures " but our forefathers loved it!). Massive pipe-nails, sprigs, hand-made chaplets, man-size riddles, and a screen for throwing the sand at—usually a building-site special (Armstrong patent)—would complete the picture. At such an exhibition, a main exhibit would be a rake-out-bottom cupola with its ex-steam-boiler shell, complete with the usual small-founders' set-up for elevating pig-iron and scrap. These materials were invariably man-handled overhead on to the first platform, and in like fashion on to the stage; wickerwork skeps containing coke were lifted first

Exhibition Aftermath

to the head-pad (Covent Garden porters had nothing on a stiff-necked cupola helper, either when mounting steps or a ladder).

One of the last stalls to come into the nostalgic dream-picture displayed sledgehammers and fancy crowbars. These were set out by the "Birmingham snake-charmers"—as the pipe- and steel-benders were then known. These tools were much in demand then for breaking the core-irons inside hot castings, where resistance to contraction on cooling off could not be permitted. (It will be appreciated that the virtues of sea-sand and linseed oil had not yet been discovered!).

Waking up to Reality

The writer had just decided in his dream that it was a very poor show indeed, when an "S.S-Queen-Mary-size" vibrator brought him back to reality, and he got the urge immediately to check up on such a vivid hallucination, and to compare his impressions of bygone days with those of modern times. So off he went on another tour of inspection, during which he maintained a stoic resistance to any more "how's-yer-father" hospitality.

He started with the sand-preparation plants, which varied from those for treating many tons per hour—embodying automatic sequence-control from knock-out to ultimate destination—to smaller self-contained units, which could mix and deliver small quantities of sand with a minimum of effort and control. Such plants produce material to any of the required permeability and bond figures now accepted as minimum standards of measure and quality, in addition to out-of-the-ordinary sand mixtures of special performance and controlled composition. There is now none of the old-time mystery of "what-is-it." Portable sand-mixers have taken away the daily "grind" of mixing sand; these mobile units can be profitably applied in several ways.

On other stands, the patterns and patternplates exhibited in various media were really works of art, and there were many outstanding examples. There is really no comparison between these and the old-time moulder-made cast-iron plates; coreboxes, etc. To the writer, the new epoxy-resin patternplates and coreboxes were a revelation in smooth mould- and core-making, and no doubt amply justify their cost and the extra processing needed. The various fillers for the resin base—marble, slate and other powdered additives—provide the necessary material strength and durability, and an almost permanent smooth surface, remarkably well suited for mould and core stripping.

Cores, Coremaking Machines, and Materials

Water-jacket coreboxes on show showed craftsmanship of the highest order. Coreblowing machines have certainly taken away the need for skilled filing and bedding-in, which was so necessary with hand-made jacket cores. Other coremaking processes, too, have been much simplified, *and have developed* in pace with other branches of foundry practice. The coresand binders and cores produced from them were most instructive. For example, the samples on show at one stand were representative of those used for a wide range of castings; cores were available which were immensely strong and had a skin like mahogany, and yet had a high collapse-value after pouring the moulds; intricate core-wiring and elaborate venting appeared to be quite unnecessary in many cases.

Air-hardening and rapid-baking coresand binders must hold enormous advantages for the moulding shop to-day. According to the invitations extended at the Exhibition to all and sundry, any core department in need of "pulling round" and improving can be confidently handed over to competent specialists available for consultation. There is no need to feel your way, and no "try-it-yourself" attitude.

In the field of ancillary equipment, the lightweight steel moulding boxes with styled and comfortable handles clearly provide an excellent antidote to fatigue. What an amazing improvement these are on the heavy, rough, homemade cast-iron types! The close limits of dimensional accuracy incorporated in these steel boxes confer clean lifts, low dimensional tolerances, and perfect joint-lines on the castings. Moreover, there appeared to be no limit as to the style and overall sizes in which these boxes can be produced. They give—to the heavy, loose-pattern type of foundry production—new safety margins, with rigidity doubly assured.

Moulding Machines and Complete Systems

Advanced moulding machines of all types and sizes were exhibited at Bingley Hall. These have been described already in the JOURNAL, and space limitations preclude a lengthy write-up here. It should be mentioned, however, that the ancillary equipment for the machines has been developed to a fine degree, and the whole represents a sizeable step nearer to automation. Even at present, half-moulds seem to "come around the corner" at a staggering rate.

To-day's designs of mould-pouring systems, and the use of one-man-operated lever ladles, have removed one of the worst and most un-attractive features in the old-time moulding shops, where hand shanks used at the cupola spout and "catching over" in split-second sequence was a risky business. "Spare metal" was often slopped about from one shank to another and always at fast-falling temperatures. It should be realized nowadays that the saving which results from reducing scrap due to "stiff" iron alone can soon defray the cost of monorail, roller-track or other pouring systems, along with rack-and-pinion hoisting. Likewise, the employment of 10 metal-carriers, plus a few skimmers, for every five shanks can be much improved upon. Old-fashioned ungeared pouring ladles with capacities of 6 cwt. or more should be made illegal!

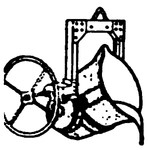
Cupola Construction

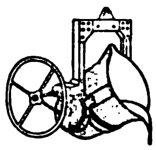
One of the most instructive ideas of the show wide-open-to-view water-cooled cupola, immense possibilities for saving in labour, ı. etc. The model exhibit showing the culation at work was excellent, as was the ater-spray device to form a spark and arrier at the cupola top. The extra roof-ciency, and saving in gutter-cleaning, well ıttention being directed to this feature, regarded as one of the normal bugbears ng time. At the show, there seemed to be to the labour-saving equipment that could d to the cupola plant to make otherwise ıbs much easier.

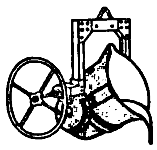
najority of castings which had come to ibition straight from the knock-out had excellent skin and general finish that ing seemed rather like "gilding the lily," several new plants developed for this purpose were really workmanlike, and built-in robustness seemed the order of the day. (And, of course, not *all* castings produced have that superlative as-cast finish, despite what some founders would have us believe!).

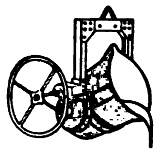
Conclusion

This wonderful Exhibition showed what has been done to elevate the foundry industry to where it is on a par with other high-class branches of engineering. It is now far removed from the old "bell-bottom-trousers-and-shovel" period, and the down-to-earth foundry personnel of to-day, clothed in smart coats or clean overalls, make a tidy and methodical approach to one of the most creative branches of industry. Foundrywork can be made as attractive to school-leavers as any of the other skilled sections of industry.









t the Standholders thought:

ıt exception, exhibitors at the Foundry ın, held at Bingley Hall, Birmingham, hat it was an outstanding success, and comments stressing particular aspects of ibition the following were received in ddressed either to the Foundry Trades nt and Supplies Association, Herbert xhibitions, Limited, or the JOURNAL:—

hose connected with the promotion of this tandingly successful Foundry Exhibition in try are to be congratulated, and it is the eeling that it is by no means the last to be

your Special Issue and catalogue for the ı was extremely well produced and one of rade catalogues I have seen. . . ."

we consider the general arrangements were d indeed, and we should certainly like to ıte someone who had the idea of combining ›ition catalogue with a normal issue of the TRADE JOURNAL, which, we think, was a dea . . . we were also very pleased with the the general public and small boys were con-by their absence, and we had the feeling all that everyone who came there had a genuine interest in everything they saw. . . ."

t was good to see our own industry operating sfully on its own instead of being tied to ›ron strings. . . ."

n the whole of our experience, the Exhibition u organized was by far the most satisfying of contacts made and orders received. . . ."

we wonder whether you are in a position to whether or not the Foundry Trades' associa-ds to stage this Exhibition again in the next wo . . . as we feel inclined to take larger n this year in any subsequent exhibitions of . . ."

". . . we certainly made many extremely useful contacts, and we shall hope to have an opportunity of participating in further exhibitions of this type which may be arranged. We hope they will not be too frequent. . . ."

". . . everybody in our company who has been concerned with this stand was thoroughly satisfied. . . ."

". . . it is to your credit as organizers that such a colourful, well-arranged foundry exhibition was held . . . this is about the first complimentary letter we have ever sent to an exhibition organizer. . . ."

". . . we congratulate you on the excellent facilities and arrangements made and the smoothness in which the whole Exhibition was conducted. . . ."

". . . we were very satisfied with the results and obtained a large number of inquiries for our equipment. . . ."

". . . you will find us coming up for a second 'dose' as soon as the opportunity is available. . . ."

". . . it was managed very well indeed, particularly as it was a first effort. . . ."

". . . we were more than satisfied with the co-operation received from your good selves and the contractors . . . convey grateful thanks for the many ways, both large and small, in which you enabled us to assemble and dismantle our exhibit with the utmost expediency and efficiency."

". . . we were quite satisfied with the results of this Exhibition. . . ."

"I considered the organization excellent and your transformation of Bingley Hall a work of art. . . ."

". . . whoever was responsible for the design did wonders with the hall itself, which is a scruffy place, but during the Exhibition it looked very smart indeed. . . ."

". . . your Exhibition Issue looked like an all-out effort. . . . "

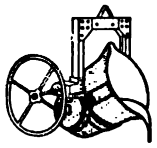
". . . preparation of this Special Issue must have

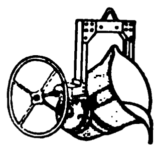
Exhibition Aftermath

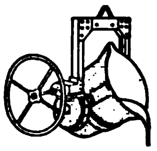
represented a major task for you and your colleagues at John Adam House and I feel you are to be congratulated upon it. . . ."

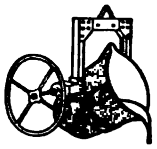
". . . the Exhibition was very good and was very enlightening to me; I felt that my trip (from the United States) was well worthwhile."

". . . I was very impressed both with the organization generally and with the quality of the exhibits. . . . I believe that if the British Exhibition were given much more publicity in the USA and Canada, a number of foundrymen on this side of the Atlantic would arrange their European vacation to coincide with the Exhibition. . . ."









Verdict from Spain:

When Señor Don José Cañameras—technologist and leading industrialist of Barcelona—returned home after visiting the Exhibition, he was interviewed by a member of the staff of *Fundicion* (the Spanish foundry trade journal). Mr. Cañameras is a member of the Council of the Association of Ironfounders of Barcelona. A translation of the interview is given below:

First of all, Señor Cañameras, what were your general impressions of this Exhibition?

In my opinion this was one of the most interesting exhibitions which has been held in recent years. The visitor was given a very clear idea of the production capabilities and general worth of the foundry plant shown. It is interesting to note that more than 100 firms had stands. The number of visitors from overseas was very large.

What was the outstanding feature?

Automation, without doubt, and following this, hygiene for the shotblast plant and working areas. This Exhibition undoubtedly reflected the energy which had been devoted to the selection and control of the raw materials used in foundry practice. Control was very precise, especially in the case of sands.

Did any equipment especially impress you?

Most certainly. I saw a moulding system (not yet well known, and bearing the description "diaphragm"), which has a useful application in the moulding of irregularly-shaped patterns, which was shown in operation using a highly-profiled pattern. Briefly, the system consists of ramming the sand through the medium of an indiarubber sheet, actuated by compressed air. Amongst the automatic moulding-machines which called for admiration was one, located on Stand 10, which had a production capacity of 240 complete moulds per hour. In this machine the empty box is placed on the machine, receives the requisite amount of sand, and from thenceforth, right the way through to the casting operation, everything is done automatically. The mechanism includes a turntable with four stations and four operations to make the complete mould. The mould, at the position where it is closed, is placed on a conveyor leading to a circular station, where it is automatically weighted and placed in position for pouring.

You have referred to hygiene in connection with shotblast and working places. Is there anything new in this connection?

There were quite a number of stands devoted to this subject, showing machines capable of working without emission of fume or dust. Complete installations for the extraction of dust were displayed. Also on show were extraordinarily simple small units (designed for connection to one or more machines) that combined extraction and filtration, and which carried a minimum of ducting. Layout for catching dust has been deeply studied, and a noteworthy contribution to working conditions has resulted.

Were there any innovations regarding the shotblasting of castings?

The classical systems of using streams of sand and chilled-iron grit, etc., have been revolutionized by installations equipped with projection turbines instead of compressed air. Many improvements have been introduced into the emery-wheel grinders. The motors are now totally enclosed in the body of the machine, and variable speed gears are incorporated to compensate for the reduction in the diameter of the wheel due to normal wear. In addition, the arrangements for dust catching have been perfected and much simplified.

Was there any special melting plant?

There was indeed, especially in the case of spark and grit arresters for cupolas. I noticed especially a collector which had a water curtain that effectively prevented emission of the products of combustion by arresting the grit; this was entrained and carried to the separator, as with the shotblasting previously mentioned.

What is the main pre-occupation, apart from safety and health, of the British foundry industry at the present moment with regard to the human factor?

Apprenticeship continues to occupy the minds of the leaders of the industry. Particularly interesting was the degree of skill shown on one of the stands, where apprentices were hand-moulding quite difficult castings and then casting them (using light alloys) very efficiently and, moreover, quite rapidly.

STAINLESS STEEL, jewellery, modern silver—including some of the best pieces made in recent years—and enamel work are on show at Stoneleigh Abbey, Warwick, until September 21.

THE NEWCASTLE OFFICE of the Lancashire Dynamo Group has been moved to new premises at Eagle Star House, 32-34, Mosley Street, Newcastle-upon-Tyne, 1.

tlas Copco's New Factory

Copco, a firm of Swedish origin, has now
nufacturing in this country for 40 years, and
ieved notable success in the making of diesel
pavement breakers and rock-drilling machines.
orks at Wembley being no longer sufficiently
cater for increased business, it was decided to
ew premises at Marylands Avenue, Hemel
ad. These have cost about £25,000, and include
ice accommodation and manufacturing facilities
h order. The office buildings are particularly
—the floral decorations displayed at the opening
y were most artistic, and reminiscent of Swedish
lecoration at its best.

of the hardening and heat-treatment shop in
Atlas Copco factory at Hemel Hempstead.

Ceremony and Luncheon

pening ceremony was performed by Lord Mills,
inister of Power, with the Bishop of Bedford
he project a blessing. At the luncheon which
d, over which the Viscount Bridgeman, K.B.E.,
.S.O., M.C., the chairman of Atlas Copco (Great
, Limited, presided, speeches were made by
ills, the Swedish Ambassador, H.E. Gunnar
f, G.C.V.O., Mr. J. C. Greig and Mr. K. A.
. the managing director of the Swedish parent
y. Distinguished representatives of many
n countries were at the high tables.

ecification

new site covers 6¼ acres, the area of the new
building being 54,700 sq. ft. Ample room has
ft for future extensions, and already an addi-
130,000 sq. ft. of manufacturing facilities is
d. The works use very large quantities of
n castings, and there is every prospect that
quirements will continue to grow.

interesting to recall that this country's fore-
of Atlas Copco—Atlas Diesel Company, Limi-
s registered 40 years ago, with a capital of
facts recorded in the FOUNDRY TRADE JOURNAL
date.)

DSIR Lending Library

The Lending Library Unit of the Department of Scientific and Industrial Research, operating from 20, Chester Terrace, Regent's Park, London, N.W.1, includes the following amongst summaries of reports which have recently become available for inspection or borrowing. In certain circumstances, enlarged photo-copies or microfilm copies are obtainable, and all enquiries should mention the reference numbers quoted.

TIDU 6189: Casting of Metals in Plaster Moulds (T.I.S. No. 4). Speciality moulding processes are reviewed briefly. The report then discusses the use of plaster moulds for aluminium-, copper- and zinc-base alloy castings. Brief data are given on comparative costs, relative to sand moulds, and on applications. Metallurgical features of plaster mould casting are described and a bibliography is included. Extracts are also given from a report on the plaster mould casting of high-speed impellers by H. Brecht, Bendix Aviation Corporation—1952. (Microfilm 3s. 6d.; enlarged print 17s. 6d.)

TIDU 6190: Casting of Metals in Permanent Moulds (T.I.S. No. 3). The various forms of permanent-mould casting are defined and their general characteristics are reviewed. Brief information is given on the techniques of permanent-mould casting and an annotated bibliography is included. Specifications are given for mould washes. (Microfilm 4s. 6d.; enlarged print 22s. 6d.

TIDU 6191: Planning the Grey-iron Foundry (T.I.S. No. 2). Foundry layout, melting plant, moulding equipment, fettling and storage are reviewed briefly. A more detailed discussion is given on the characteristics of moulding sands. A useful bibliography is included and reference is made to a report prepared by the Anglo-American Council on Productivity entitled "Grey-iron Founding." (Microfilm 3s. 6d.; enlarged print 17s. 6d.)

TIDU 6173: Impregnation of Metal Castings (T.I.S. No. 24). The conditions for which impregnation is justified are specified briefly and a short discussion is given of the various materials and methods used. A bibliography lists some 35 references to the subject. (Microfilm 2s. 6d.; enlarged print 12s. 6d.)

Stornoway House

Stornoway House, an historic mansion overlooking Green Park, London, has now become the headquarters of the Firth Cleveland Group. It was opened recently, after rebuilding, by its last resident, Lord Beaverbrook, who lived there from 1921 until its destruction by German bombs in 1941. The rebuilding has been carefully carried out, under the personal supervision of Mr. C. W. Hayward, chairman and managing director of the group, so that it has much the same aspect as when it was built by Lord Grenville in 1794. The basement kitchens have been converted to a showroom, and a selection of the 100 diverse products of the group are attractively displayed. Readers are invited to visit these showrooms where they can inspect the very interesting Surform tools, garden implements, radio sets, etc., and a variety of industrial equipment.

F. TAYLOR & SONS (MANCHESTER), LIMITED—Col. L. Bullen has been appointed managing director.

Birthday Honours

Recognition of services to the foundry, iron and steel, and allied industries was made in the Birthday Honours List. Details of some of the principal awards and biographical notes on the recipients are given below:—

KNIGHTS BACHELOR

Mr. L. C. Gamage, chairman and managing director of the General Electric Company, Limited, and president of the Institute of Exports; Mr. A. M. C. Jenour, chairman and joint managing director of the Aberthaw & Bristol Channel Portland Cement Company, Limited, and a member of the Development Corporation for Wales; Capt. W. M. H. Pollen, chairman of Burt Bros., Limited, and of Sheffield Steel Products, Limited, and subsidiary companies; Mr. K. H. Preston, chairman of Stone-Platt Industries, Limited, J. Stone & Company (Holdings), Limited, Platt Bros. (Sales), Limited, and Textile Machinery Makers Limited, and a director of W. & T. Avery, Limited, and Henry Pooley & Son, Limited; Mr. W. W. Wood, former Town Collector of Sheffield and the only man to have been Master Cutler six times. After practical experience in a Sunderland marine engineering works he joined the Wardsend Steel Company, Limited, which had been founded by his grandfather in 1860. He owned and controlled the firm when it was acquired by Darwins, Limited, in 1944.

ORDER OF THE BATH

CB

Col. T. F. Hood, a director of Spencer (Melksham), Limited, manufacturers of elevating and conveying plant, etc., and other companies.

ORDER OF THE BRITISH EMPIRE

GBE

Sir William Palmer, chairman of the Catmur Machine Tool Corporation, Limited, vice-chairman of Rank Precision Industries, Limited, and from 1944 to 1946 principal industrial adviser to the Board of Trade. He is chairman of the European Free Trade Committee.

CBE

Mr. T. C. Hewlett, a director of the Anchor Chemical Company, Limited, and the United Oil & Natural Gas Products Corporation, Limited; Mr. C. F. L. King, a director and general manager of the British Wagon Company, Limited, and a director of other companies; Mr. A. H. White, deputy chairman and managing director of Lithgows, Limited, the Port Glasgow shipbuilders and repairers.

OBE

Mr. K. S. Arnold, a director and general manager of Duncan Stewart & Company, Limited, hydraulic and steelworks engineers, etc., of Glasgow; Mr. H. Bowley, senior principal scientific officer, National Physical Laboratory; Mr. A. Brewin, senior principal scientific officer, Explosives Research and Development Establishment, Ministry of Supply; Mr. D. R. Graesser, director of Higginbottom & Company (Manchester), Limited, chemical and metal merchants; Mr. D. A. Palmer, chairman and managing director of Joseph Rodgers & Sons, Limited, Maleham & *Yeomans, Limited, and* Read & Oxley, Limited, and chairman of Reavell & Company, Limited; Mr. N. J. Payne, partner in Frederick Snow & Partners, consulting engineers, of London, W.C.2; Mr. G. A. Plummer, a director of John Thompson, Limited, La Mont International Association, Limited and La Mont Steam Generator Limited; Mr. S. H. Russell, chairman of S. Russell & Sons, Limited, Leicester, ironfounders and engineers, and a past-president of the Institute of British Foundrymen, the National Ironfounders Employers' Federation, and the British Cast Iron Research Association; Mr. N. C. Smart, chief engineer (telephone and exchange system), General Electric Company, Limited.

MBE

Mr. M. Adamson, blast-furnace projects engineer, Ashmore, Benson, Pease & Company, Stockton-on-Tees; Mr. C. Allsop, chief research engineer, Bruce Peebles & Company, Limited, manufacturing electrical engineers of Edinburgh; Mr. P. Armstrong, superintendent of the erecting shop, W. H. Allen. Sons & Company, Limited, hydraulic and electrical engineers, etc., of Bedford; Mr. W. C. E. Bell, manager and engineer of the ore preparation and sinter plants of Dorman Long (Steel), Limited, Middlesbrough; Mr. E. Berry, deputy manager, contracts department, Vickers-Armstrongs, Limited; Mr. W. H. Bickle, senior experimental officer, Department of Scientific and Industrial Research; Mr. R. A. Harman, chief civil defence training officer, Imperial Chemical Industries, Limited; Mr. T. A. Hough for 14 years works manager of the D.P. Battery Company, Limited, Bakewell (Derbyshire); Mr. G. D. McGlashan, senior assistant works manager, Alexander Stephen & Sons, Limited, shipbuilders and repairers, etc., of Glasgow; Mr. B. Pringle, manager of motor engineers, British Thomson-Houston Company, Limited, Rugby; Mr. A. Rodger, electrical manager, William Denny & Bros., Limited, shipbuilders, of Dumbarton; Mr. S. Shaw, welfare and safety officer, George Kent, Limited, industrial instrument and automatic control manufacturers, of Luton; Mr. J. A. W. Sinclair, chief designer, Brown Bros. & Company, Limited, metal stockholders, etc., of Edinburgh; Mr. F. H. Smith, director of optical design, C. Baker Instruments, Limited, Croydon; Mr. J. M. Stamper, honorary secretary of the Hull Productivity Committee and secretary of the Hull Iron Trades Employers' Association; Miss M. H. Turpie, senior executive officer, Ministry of Power; Mr. D. C. Woollard, higher executive officer, Ministry of Power.

BRITISH EMPIRE MEDAL

Mr. E. R. Booth, toolroom foreman, Moore & Wright (Sheffield), Limited; Mr. G. Bowman, head foreman, Harland & Wolff, Limited, Belfast; Mr. E. Chambers, chargehand plater, the Tees Side Bridge & Engineering Works, Limited; Mr. J. Cook, charging machine driver, Colvilles, Limited; Mr. W. Craig, traffic and materials supervisor, J. & E. Hall, Limited, Glasgow; Mr. G. H. Heron, foreman fitter, Middle Docks & Engineering Company, Limited, South Shields; Mr. W. Jones, steelworker, John Summers & Sons, Limited, Shotton (Ches); Mr. C. H. Mackenzie, process foreman, fabrication of titanium, Imperial Chemical Industries, Limited (Swansea); Mr. J. Neeld, toolmaker, C.A.V., Limited, Acton; Mr. G. A. Newby, head foreman shipwright, J. S. Doig (Grimsby), Limited.

The Eastern Region of the Institution of Production Engineers is organizing a conference on the theme "Production Engineering as a Function of Management." It is to be held in Norwich on September 24 and 25. Details are available from the conference secretary, c/o George Wortley, Limited (Travel Agents), 4, Charing Cross, Norwich, Norfolk.

News in Brief

WISS IRON FOUNDERS' ASSOCIATION reports that production of iron castings in Switzerland 000 *tonnes*, as against 185,000 *tonnes* in 1957.

ts & FORSTER, LIMITED, structural engineers, at their standard building department is being ed from head office at Barking to new and emises adjoining the branch works at Warton ondon, E.15.

OUNDRY EQUIPMENT FIRM, Coleman-Wallwork , Limited, Stotfold, near Arlesley, Beds., are pace at the forthcoming International Trade be held in Brno, Czechoslovakia, from r 6 to 20.

EW PLANT in East Kilbride of J. R. Carruthers any, Limited, pump makers, was started up in commencing August 3. According to a spokes- the firm the new factory will be officially on September 18.

BRISTOL COLLEGE OF TECHNOLOGY, as from r 1960, will be designated as a college of technology. It will be the ninth to be signated under the Government's plan for g technical education.

N & HORNSBY, LIMITED, engineers, Lincoln, nted staff with more than five years' continuous fter the age of 20, an extra week's holiday , giving them three weeks' holiday. The omes into operation immediately.

UNITED STATES AMBASSADOR, Mr. John Hay and Lord Shawcross, P.C., Q.C., will be the speakers at the 1959 National Conference of sh Institute of Management. This year it will at Harrogate from November 17 to 19.

ATOMIC ENERGY AUTHORITY will be staging an n in Sheffield in November or December this here are to be two main sections of the exhibi- e will deal with atomic energy as a means of g electricity and the other will cover radio-

G EXCAVATION WORK inside the iron foundry t A. Main, Limited, Falkirk, some Roman ions, believed to have been an outpost, have arthed. The site of the foundry is known to en one of the important stations on the Wall.

MISSION ACCESSORIES, LIMITED, has changed to the Conveyor and Shotblast Company, Leighton Buzzard, as its activities now include ufacture of cut-wire steel shot. The making ine segmental wire-rope overhead-conveyors continued.

NING COPIES of the publication of the South branch of the Institute of British Foundrymen, Design as Influenced by Foundry Practice," r Smalley, O.B.E. (with a foreword by D. chet) are being offered for sale to local mem- 0s. 6d. each.

DAVID ROBERTSON, managing director of Castings, Limited, Warrington, has saved the n closing by purchasing it from the proprietors, ndustries, Limited, who announced in April y would be closing the factory on July 24. e has been changed to Ferrous Light Castings imited.

RTS AND LLOYDS, LIMITED, are receiving an supply about 270 miles of 16-in. dia. steel pipe for use in the construction of an oil pipeline in Assam. The order, which is being placed by the Burmah Oil Company on behalf of Oil India Private and with the agreement of the Government of India, is worth £2,000,000.

FOLLOWING THE COMPLETION of their new Efco automatic hardening and tempering line, Caterpillar Tractor Company, Limited, have placed further orders for furnaces with Electric Resistance Furnace Company, Limited. The new orders valued at nearly £50,000 cover the supply of both batch- and continuous-hardening furnaces and a continuous-tempering furnace.

THE ENGINEERING FIRM of Blake, Barclay & Company, Limited, Greenock, has been acquired by Mr. Archibald D. Kelly, Kilmacolm, who has various engineering interests in the district. A reorganization scheme which is now in progress is likely to be completed within the next two months. New types of sugar machinery are to be built at the works. It is hoped eventually to increase the number of employees from 40 to 150 or more.

J. D. S. TOWNSHEND & COMPANY, LIMITED, 99, Fenchurch Street, E.C.3, has been formed to take over the agency business hitherto conducted by Mr. J. D. S. Townshend, formerly of the Sandwell Casting Company. The company is represented in London, the Home Counties and Southern England, and is agent for iron, steel, malleable and non-ferrous founders, and gravity and pressure-die-casters in aluminium and Mazak.

"OPERATIONAL RESEARCH AT WORK" will be the subject of a one-day conference organized jointly by the British Institute of Management and the Operational Research Society. It will be held at the Connaught Rooms, Great Queen Street, London, W.C.2, on Thursday, September 17. The objective of the conference is to assist management in assessing the extent to which the techniques of operational research are applicable within industry.

THE FIRST INTERNATIONAL CONGRESS ON METALLIC CORROSION will be held in South Kensington, London, during the week April 10 to 15, 1961, under the presidency of Sir Harry Melville, K.C.B., D.SC., F.R.I.C., F.R.S. Mr. E. Leslie Streatfield has been appointed chairman of the executive committee and Dr. J. Ferguson, chairman of the finance committee. The honorary secretary is Lt.-Col. Francis J. Griffin. Further information may be obtained from the honorary secretary at 14, Belgrave Square, London, S.W.1.

TWO BRITISH COMPANIES, Leyland Motors, Limited, and Metropolitan-Cammell-Weymann, Limited, after facing fierce international competition from Germany, USA, and Japan, have secured a £1,500,000 contract from Cuba for 200 diesel buses. They will operate in the City of Havana, where 620 Leyland buses valued at 8,680,000 dollars were shipped eight years ago. The economical and reliable service given by these buses in the Cuban capital have influenced considerably the placing of the new order.

A NUMBER of Aberdeen's old steam trawlers are to be broken up at the Montrose shipbuilding yard, recently taken over by John Lewis & Sons, Limited, Aberdeen. The first trawler to be broken up will be the Loch Awe and other trawlers will follow at intervals. A spokesman for the firm said that the Montrose yard will not be used only for shipbreaking. The firm will build new vessels there as well, and one now actually under construction is a trawler 1,046-ft. long for Aberdeen owners.

News in Brief

Establecimientos Industriales Lara, the first Venezuelan plant for the manufacture of household appliances, was recently established in the city of Barquisimeto (Lara). Totally owned by domestic interests, the company has a capitalization of 8 million bolivares (£800,000), and will engage in the manufacture and marketing of refrigerators, washing machines, kitchen ranges, home incinerators, and other items. When operating at full capacity, the plant will employ about 3,000 people.

A team of Soviet experts has arrived in Colombo under the technical and economic assistance programme, to begin work on a £7,500,000 iron and steel project. The entire capital for the project is to come from the 120,000,000 roubles loan granted to Ceylon by the Soviet Union under an agreement signed in January last year. The factory is to be established in three easy stages. In its third stage, local iron ore will be smelted to produce the required quantities of pig-iron for the steel works and the local foundry industry.

The rapid development in recent months of South Africa's new iron-ore exporting industry, facilitated by the easing of the Union's rail transport bottleneck as well as by the recent higher rate of activity in the world's steel industry, has resulted in a firm—Fritzmorr Exploration—setting themselves a target of 500,000 tons for 1961. At present they ship some 15,000 tons a month. The Union's total exports of iron ore in June alone were more than double those in the whole of 1958, while exports for the first six months of 1959 were more than six times 1958's total tonnage.

The first double-deck long-distance motor coach with its engine at the rear was introduced by Ribble Motor Services, Limited, Lancashire, in Bank Holiday week. The vehicle is an Atlantean rear-engined model produced by Leyland Motors, Limited, with a 50-seater coach body built to the design and layout of Ribble's engineering department by Metropolitan-Cammell-Weymann, Limited. The coach is 30-ft. long, 8-ft. wide, 14-ft. 4-in. high and weighs nearly 10 tons. So far Ribble Motor Services have ordered 51 Atlantean chassis from Leyland's, although not all of these vehicles will be used for luxury coaches.

Universal-Matthey Products, Limited—an associate company of Johnson, Matthey & Company, Limited, and Universal Oil Products Company—has formed a subsidiary company in Cologne, Universal-Matthey Products (Deutschland), GmbH, with a nominal capital of DM 20,000 (£1,700). The objective of the company is the manufacture of platinum catalysts to meet the needs of petroleum refineries employing the UOP Platforming process in Western Germany and the Common Market countries. Mr. L. C. Montague and Mr. F. O. Newton have been appointed members of the board of administration, and Mr. A. E. Richards has been appointed manager.

A new open convector fire, available in a range of attractive vitreous-enamel colour finishes, is being introduced by Newton Chambers & Company, Limited of Thorncliffe, near Sheffield, for the coming autumn. Called the Redfyre Convector 2, the fire will burn any domestic smokeless fuel or house coal and is designed for rooms up to 2,000 cub. ft., heating by both radiation and convection. Designed in consultation with Brian Asquith, A.R.C.A., the fire has neat simplicity of line — and the front has a vitreous-enamel finish in blue-grey, off-white, plain cream or black lustre. A clip-in safety guard (which cannot get hot), of heat-resistant chromium finish is an integral part of the appliance.

Commonwealth Aluminium Corporation, Limited (COMALCO) has spent £A1,000,000 so far on surveying vast bauxite resources discovered at Weipa on Cape York Peninsula in North-Eastern Australia, according to Mr. Evans, Queensland Minister for Mines. He said that much of the Corporation's spending had been on further prospecting to assess the extent of the field, on drilling for water and on the construction of a small township. The Corporation was now surveying in detail Port Musgrave, on the north-east coast of the peninsula, in an attempt to maintain a navigable channel and establish a suitable harbour. British Aluminium, Limited, and the Australian company, Consolidated Zinc, are associated in the enterprise.

Dr. F. J. du Toit, chairman of Foscor and Sasol and deputy chairman of Iscor—three big semi-state industries of the Union of South Africa—reports that during the last financial year, Sasol returned a cash surplus from its oil-from-coal operations; Iscor will be producing nearly 2,500,000 tons of steel by 1961; and Foscor has all the raw materials required to make the Union independent of phosphate fertilizer imports. The large quantities of chemical raw materials being produced by Sasol and Iscor would form the basis of a vast new chemical industry in the Union. A £56,000,000 expansion programme was in progress at Iscor and the value of its products this year totalled about £60,000,000.

The Association of Bronze and Brass Founders is organizing area competitions for bronze and brass foundry apprentices, the purpose being to encourage these apprentices; to provide candidates for the European Foundry Apprentice Competition to be held in this country next year; and to attract young people to the foundries. The competitions will comprise both practical and written work. The secretaries of the Association, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15, invite bronze and brass founders in the Midland, Yorkshire, Lancashire and Cheshire areas, and Scotland, to let them know if they would support such competitions and also the number of apprentices under 21 years of age they would be prepared to enter.

The Combustion Engineering Association Conference is to be held on November 3 and 4 at the Royal Hotel, Scarborough. The "Automatic Boiler House" covering the application of automation to the smaller industrial boiler plant using solid fuel is one of the main topics to be discussed. Four technical sessions to discuss "Fuel and Ash Handling," "Combustion and Mechanical Firing," "Principles of Automatic Combustion Control," "Application of Automatic Control" will be followed by group and open discussions, and a final session at which the economics of automatic equipment will be assessed. The conference will be open to the public. Full details are available from the Association, at 70, Jermyn Street, London, S.W.1.

Foseco Competition

Foundry Services, Limited, Long Acre, Nechells, Birmingham 7, announce that from the very large number of entries in their "1978" Competition, the judges have selected the article by Mr. D. Lie Eide of Bergen, Norway, for the most original thought in all aspects of foundrywork. Mr. Eide has received the first prize of £100, the second prize was divided between Mr. L. Bearne, Lower Stondon, Beds., and Mr. R. F. Cornell, Braintree. The third prize went to Mr. F. D. Roper of Dudley, Worcs.

Personal

Mr. R. H. Powell has relinquished his appointments with the Griffin & George group of companies.

Mr. T. Furness, secretary and a director of Thomas Robinson & Sons, Limited, Rochdale, has been appointed a joint managing director of the company.

Mr. Frederick E. Myer has been appointed the director of the Singer Sewing Machine Company, Limited. He will continue to be manager of the accounts department.

Mr. R. H. C. Boys has been appointed a director of Roan Antelope Copper Mines and of Mufulira Copper Mines. Sir Charles Cummings has resigned from the boards of both companies.

Mr. W. J. Bird has been appointed to the board of Claude-General Neon Lights, Limited, a subsidiary of the General Electric Company, Limited. Mr. Bird is home sales director of the parent company.

Metropolitan-Vickers Electrical Company, Limited, have appointed Mr. E. J. Scotcher, B.SC. TECH., A.M.I.E.E., as factory superintendent at their Huyton works. He was previously assistant superintendent.

Mr. K. E. Walker, director in charge of the engineering division of Newton Chambers & Company, Limited, Thorncliffe, Sheffield, has been elected a director of the F. C. Construction Company, Limited, ironfounders, Derby.

Mr. R. C. Heys, deputy chairman and managing director of Millspaugh, Limited, Sheffield, was amongst 17 employees of the company to receive, on August 14, presentations on completion of 25 years' service with the firm.

Mr. James Alderson, formerly secretary and a director of Hartley & Sugden, Limited, boilermakers, Halifax, celebrated his golden wedding on August 10. Mr. Alderson retired in 1955, after 59 years' service with the company.

Mr. A. L. Stock, managing director of the Morgan Crucible Company, Limited, has been appointed chairman in succession to Mr. Peter Lindsay, who has retired because of advancing age. Mr. H. L. Matthey becomes managing director.

Lord Baillieu, K.B.E., C.M.G., president of the Dunlop Rubber Company, Limited, has accepted the nomination of the Council of the British Institute of Management for election as president at the annual general meeting in October.

Mr. T. Crompton, financial director of Yorkshire Imperial Metals, Limited—owned jointly by Yorkshire Copper Works, Limited, and Imperial Chemical Industries, Limited—has been appointed a director of Yorkshire Copper Works (Holdings), Limited.

Lord Mills, Minister of Power, has appointed Mr. C. R. King to be chairman of the Electricity Council in succession to Sir Henry Self, who retires on August 31. Professor R. S. Edwards, who is at present a part-time deputy-chairman of the Electricity Council, will serve full time from October 1.

Lord Reith has been appointed a director of the North British Locomotive Company, Limited, Glasgow. He is vice-chairman of the British Oxygen Company, Limited, and a director of Tube Investments, Limited. In March last he retired from the chairmanship of the Colonial Development Corporation.

Mr. L. R. P. Pugh, director and secretary of Guest Keen Iron & Steel Company, Limited, has been appointed assistant managing director and is succeeded as secretary by Mr. C. F. Pagnamenta, at present chief accountant. Mr. B. W. John, at present assistant secretary succeeds Mr. Pagnamenta as chief accountant.

Mr. G. R. J. Hallam has been elected a director of H. W. Kearns & Company, Limited, Broadheath, Altrincham. He has been appointed works director in succession to Mr. Oscar Rendell. Mr. Rendell has retired from the directorship because of ill health but will remain with the company in a consultative capacity.

Air Commodore Francis Rodwell Banks is joining the board of the Blackburn group. He will also join the boards of two other companies in the group—Blackburn Aircraft and Blackburn Engines. Until recently Air Commodore Banks was a director of Bristol Aeroplane Company, Limited, and Bristol Aero-Engines, Limited.

Mr. M. Robinson—who has been associated with the Lancashire Dynamo group since 1946—has been appointed manager of the group's Bristol area office in succession to Mr. E. N. Evans. At a lunch held recently in Bristol, Mr. D. C. Lorkin (managing director of the group) made a presentation to Mr. Evans on behalf of the company, directors and staff.

Viscount Falmouth has been re-elected president of the British Internal Combustion Engine Research Association and the following have been re-elected vice-presidents: Sir Harold Roxbee Cox; Rear-Admiral W. F. B. Lane (director of Marine Engineering, Admiralty); Mr. H. N. Pemberton (chief engineer surveyor, Lloyd's Register of Shipping); Professor O. A. Saunders; and Brigadier S. A. Stewart (director, Royal Engineer Equipment, Ministry of Supply). Mr. J. G. Dawson and Mr. A. G. Howe have been elected to the Council in succession to Mr. G. B. R. Feilden and Mr. Lawrence Robson. Mr. V. H. F. Hopkins has been elected as chairman of Council and Mr. J. G. Dawson as vice-chairman.

Obituary

Mr. W. E. Watson, M.B.E., who was works director of the Smiths Aviation Division, Cheltenham factory, has died at the age of 56.

Mr. J. A. Marshall, senior, founder and president of Marshall & Anderson, Limited, Broomside Boiler Works, Motherwell, has died at the age of 83.

The death has occurred at the age of 62, of Mr. Thomas Geoffrey Lucas, director of Edward Lucas & Sons, Limited, ironfounders, Dronfield, near Sheffield.

Mr. C. E. Jarvis, who has died at the age of 88, was until his retirement leader of the drawing office staff of Newton Chambers & Company, Limited, Chapeltown, Sheffield.

Mr. J. B. Hemsley, a former metallurgist at Samuel Fox & Company, Limited, Stocksbridge, Sheffield, has died at the age of 67. He served with the company for 50 years before retiring in 1957.

Dr. William Kerr, C.B.E., Emeritus Professor of Civil and Mechanical Engineering and Applied Mechanics at the Royal College of Science & Technology, Glasgow, has died at the age of 72. He had been a distinguished student of the College before joining the staff in 1919, following extensive practical training with the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, where he was engaged with the design of large sets of turbine machinery and gearing. He gained the Ph.D.deg. of Glasgow University in 1923. His work on the steam friction of turbine wheels and on the critical speeds of revolving shafts was incorporated in many text-books.

Raw Material Markets

Iron and Steel

Many of the foundries have now returned to work following their annual holidays. Most establishments are quite busy. While there is still a varying degree of business available, depending on the type of castings produced, this is not so pronounced as before. Most of the light foundries continue to be much better employed with the improved demand for castings for household appliances and for the building trade. Their capacity is, however, nowhere near fully absorbed. The jobbing foundries could undertake more work and the textile foundries are similarly placed. The high-phosphorus iron used by these foundries is plentiful.

The motor vehicle industry continues to provide the engineering foundries with sufficient business for high-duty castings to enable them to return good outputs. Other sections of the engineering and speciality foundries supplying castings to other trades are also fairly well engaged, and there has been some improvement in the call from the machine-tool industry. The pig-irons used by these foundries, chiefly in the low-phosphorus grade, are readily available. The requirements of the engineering foundries for hematite pig-iron are readily met, while the refined iron makers are also short of orders. The steelworks are able to obtain easily all the basic pig-iron required for consumption and stock. Producing furnaces have fairly heavy stocks of all grades of pig-iron, and have tonnages available for export. Some business is being obtained for shipment, but competition continues very stiff.

Much improved trading conditions are found at the re-rollers, whose business has been increasing in recent weeks. There is a continued upward demand for small bars and light sections, and the rollers of reinforcing rods and wire rods are very busy. The extent of the increased trade is reflected in the bigger call for steel semis and many of the steelworks are committed for their outputs for three or four weeks ahead; this period of delivery most of them require for fresh business.

Non-ferrous Metals

It would be difficult, if not impossible, to telescope satisfactorily in a few paragraphs all the major influences affecting the non-ferrous metal markets since our last report before the printing industry dispute. In general terms, however, the copper market on both sides of the Atlantic has been decidedly shaky at times, with the markets in both centres waiting for a decision one way or the other on what was to be the best advertised strike in history and which finally started last week when there was a walk-out at four western US plants of the Kennecott Copper Corporation.

Before the strike last week buying was, at best, only fair and the market was tested from time to time by either raising or lowering the custom smelters' and producers' price. The fact that the markets were flat was due to production outrunning consumption, with the consequence that stocks are at record levels in the US and have gained about 6,000 tons in the UK over the past six months.

Corrective action has been lacking, apart from a few companies stating that they were cutting back production by about 10 per cent. Yet the economies of both the UK and the US are getting into top gear and, with both Wall Street and Throgmorton Street doing brisk business, the quotation regained a great deal of its former losses, particularly in this country.

The present position is that demand in the UK can be described as quietly steady, that of Europe, quiet, while in America supplies are building up to peak levels.

The strike at Kennecott looks like spreading throughout the US copper industry and it is expected that by the end of this week Anaconda and Phelps-Dodge will also be strike-bound, thereby idling some 40,000 workers. There is, however, a possibility that agreement may be reached shortly. Even so, stocks are high and fabricators can live off their fat for some time before anything like an emergency appears. The curious thing is that no one seems clear on what are the demands made by the labour unions. Usually reliable sources .say that the principle issue centres around a wage increase of 15 cents an hour, but this has not been officially stated. The US custom smelters' price and the producers' price are both the same at 30 cents a pound, at which level demand is quiet. At the end of July, stocks of refined copper in the US totalled 103,432 tons. This figure compares with a total of 85,674 tons at the end of June.

In the UK demand is quiet, but reasonably satisfactory bearing in mind that this is still the holiday period. The market has derived strength from the labour situation in the United States, but in view of the stock position over there and in this country the US strike will have to be widespread and will have to endure for a while before the price levels rise very far. At the end of last week stocks of refined copper in LME warehouses totalled 15,038 tons.

Tin has been a consistently good market over the past two months. The buffer stock manager is thought to have reduced his stocks, which, if true, says a good deal, as the quotation has edged up and is now well clear of £790 a ton. In the US demand has been quiet owing to the month-old steel strike, which has tied the hands of the tinplate industry. This situation has been reflected in the New York quotation, which is fractionally below $1.03 a pound. At the end of last week stocks in LME warehouses totalled 8,553 tons.

Lead, after its long period in the doldrums, appears to be coming to life—albeit slowly. In any event, the UK price is now well above the £70 a ton level which had acted as a magnet for the quotation for so long. The outlook is better, too, as the undertone is firm and the belief is that the price will go higher in the months ahead. In the US the price has held steady at 12 cents a pound.

Zinc has fared better than any of the other metals over the past two months and the quotation has slowly, but persistently, gone towards higher levels. In the UK demand is good for both high-grade and ordinary brands and the outlook is reasonably bright, demand is concentrated mainly on nearby supplies, which are not too plentiful. In the US the steel strike has slowed down demand somewhat, but sentiment over there is good and so soon as the steel strike is over a rise in the price from its present level of 11 cents a pound can be looked for.

British Transport Commission announce that about 350 traders are now regularly making use of the packing-case hire service introduced by British Railways in co-operation with Collico, Limited, of Barking. The latest figures show 11,250 cases to be on hire. This service, provides collapsible cases on a monthly hire basis, and the hiring charge covers the cost of rail carriage both on the loaded and empty journeys; senders pay rail charges on only the weight of the contents. Each container can carry up to 2 cwt. of merchandise and is suitable for any type of small consignment.

adam, you're plugging into he atom *(and steel is helping as usual)*

A REPORT BY J. STUBBS WALKER

ADA McALLISTER IS ONE OF
ITAIN'S ATOMIC HOUSE-

of the power she uses
day in her all-electric
near Whitehaven comes
e world's first industrial
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Mrs. McAllister, unlike
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Y INCH PERFECT

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there are steel supply
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,000 tons of reinforcing
the concrete that protects
ports the plant.

here is more than sheer
in the help steel has
o atomic power. Steel

JOHN STUBBS WALKER *is internationally known as a writer and broadcaster on scientific and technical subjects. He is a specialist on electronics and atomic energy, and recently completed a survey of the research done by the British Steel Industry.*

MRS. ADA McALLISTER *uses the atom for power, but she didn't realise how necessary steel is to make that power available. The vital part that steel plays in peaceful atomic energy may surprise you, as it did her.*

controls that enormous power. Rods of special steel can be plunged in to the very heart of the reactor, absorbing some of the energetic particles and reducing the heat given out. Ordinary steel would not do for this.

EVEN BETTER THAN THEY EXPECTED!

The atom scientists called on the Steel Industry for a steel with a high *boron* content, which would soak up atomic energy.

By the high standards attained in alloy steel productions, boron steel is not difficult to make, even with the high boron content which the atom scientists required. But it is very difficult to make a boron steel that can be shaped easily.

From Sheffield, centre of the special steels industry, came the answer – a steel containing boron that could be shaped with ease. The steel men gave the atom scientists even more boron in this steel than they had asked for originally.

Then there are thin tubes of stainless steel – inelegantly named " sniffers " – on which the safety of an atom plant depends. They " sniff " at each fuel channel to check for radioactivity, which would indicate a burst fuel element. At Calder Hall, every fuel channel – and there are thousands of them – is "sniffed" every 27 minutes.

There is no doubt about it Mrs. McAllister would not yet be plugged in to the atom but for the work the steel men have done for nuclear power.

This personal report was invited by the British Iron & Steel Federation, which believes that everyone in Britain should know the facts about steel and about the men who make it.

Current Prices of Iron, Steel, and Non-ferrous Metal

(Delivered unless otherwise stated)

August 19, 1959

PIG-IRON

Foundry Iron.—[illegible] Birmingham, £29 [illegible]

Low-phosphorus Iron.—[illegible] per cent. P [illegible] £32 [illegible] Birmingham. [illegible]

Cylinder and Refined Irons.—North Zone, £35 4s. 6d.; South Zone, [illegible]

Refined Malleable.—[illegible] per cent. max. North Zone, £38 4s. 6d.; South Zone, £38 [illegible]

Hematite.—[illegible] per cent. [illegible] England [illegible] Zone [illegible] Birmingham £38 [illegible] Wales [illegible]

Basic Pig-iron.—[illegible] Staffs, Derbyshire, [illegible] Rutland, [illegible] and Leicestershire, in [illegible]

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £61 5s. 0d. to £63 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, [illegible] 10s. 0d. to [illegible] 10s. 0d., scale 15s. 0d. to 18s. 0d. per unit.

Ferro-vanadium. 50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum. 65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium. 20/25 per cent., 2-3 per cent. Cu, £220 0s. 0d.; 38/40 per cent., commercially carbon-free, [illegible] 0s. 0d.

Ferro-tungsten. 80/85 per cent., 9s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 7d. per lb. of W.

Ferro-chrome (6 ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr.

Metallic Chromium. 98/99 per cent., 6s. 10d. per lb.

Metallic Manganese. 94/96 per cent., carbon-free, £245 0s. 0d., 96/98 per cent., £275 0s. 0d.

Ferro-columbium. 65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (standard). 78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 8 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £39 10s. 0d.; hard, over 0.41 up to 0.60 per cent. C, £39 15s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, N.-E. Coast, £42 2s. 0d.; boiler plates, N.-E. Coast, £44 12s. 0d.; floor plates, N.-E. Coast, £43 11s. 0d.; angles, N.-E. Coast, £39 16s. 6d.; joists, N.-E. Coast, £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 10s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £66 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £234 0s. 0d. to £234 5s. 0d.; three months, £231 15s. 0d. to £232 0s. 0d.; settlement, £234 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3½d. per lb.; rods, 253s. 6d. per cwt. basis; 20 s.w.g., 288s. 6d. per cwt.

Tin.—Cash, £792 10s. 0d. to £793 0s. 0d.; three months, £792 10s. 0d. to £793 0s. 0d.; settlement, £793 0s. 0d.

Lead (Refined Pig).—Second half August, £72 12s. 6d. to £72 15s. 0d.; second half November, £73 15s. 0d. to £73 17s. 6d.

Zinc.—Second half August, £86 10s. 0d. to £86 15s. 0d.; second half November, £85 0s. 0d. to £85 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £121 7s. 6d.; rolled zinc (boiler plates), all English destinations, £119 2s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £97 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10¾d. per lb.; sheets to 10 w.g., 202s. 0d. per cwt.; wire, 2s. 8½d.; rolled metal, 202s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £156; B6, £201.

Brass (High Tensile).—BS1400, HTB1, £187; HTB2, £202; HTB3, £214.

Gunmetal.—BS1400, LG2, £192; LG3, £202; G1, ½%, £254; G1, 1%, £239.

Phosphor Bronze.—BS1400, PB1 (AID released), £287; BS1400: 90/10/1, £272.

Leaded Phosphor Bronze.—BS1400, LPB1, £213.

Phosphor Bronze Strip, etc.—Strip, 290s. 9d. per cwt.; wire, 4s. 1⅛d. per lb.; rods, 3s. 4¼d.; tubes, 3s. 4½d.; chill cast bars: solids 3s. 4¼d.; cored 3s. 5¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10¼d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3¼d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £230; AB2, £242.

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* Average 68-70 per cent.

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LIVERPOOL, 2.
13, Rumford St.,
Central 1558

GLASGOW, C.2.
93, Hope Street,
Central 9969

Publications Received

Aluminium Rainwater Goods. Published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1; price 10s. 6d.

Now that the aluminium industry has entered the rainwater goods field, it is pleasing to note from this booklet that the job has not been entirely lost to the foundry industry, as many components are offered in the cast state. This essentially high-grade publication utilizes good illustrations, and carries a number of blue prints and practical instructions for the installation of aluminium rainwater goods on various types of buildings; painting recommendations are also included. It should be of real service to architects.

Technical Notes, No. 197. Issued by CIBA (A.R.L.), Limited, Duxford, Cambridge.

This *Bulletin* is devoted to detailing uses of Araldite epoxy resins for foundry patterns. It is full of really sound information and amongst this is a table showing the amount of accelerator to use under varying circumstances. It appears that a wrong formulation causing excessive exothermic reaction can result in distortion. This pamphlet could act as a model for Press relations officers, because it accords to readers the courtesy of giving names and addresses of suppliers of the ancilliary materials. Only too often Press releases omit to give such information. It is recommended that all founders and patternmakers acquire this useful *Bulletin.*

British Instruments—Directory and Buyers' Guide. Published by United Science Press, Limited, Boswell House, Gough Square, Fleet Street, London, E.C.4; price £2 2s. 0d.

The function of modern industry is increasingly dependent upon scientific instruments. With the publication of this manual, sources of supply are made available in a readily accessible form. Moreover, this information, through French, German and Spanish glossaries, is equally available to foreign nationalities - a service enhanced by listing the manufacturers' agents overseas. Finally, in a standardized series of alphabetically arranged advertisements, the products of the various companies are illustrated and described. The whole is compressed into some 600 pages. This is unquestionably a valuable work of reference in the office of any purchasing agent.

Safety. The Magazine of Accident Prevention and Health. Published by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

The most interesting article in this issue is "Foreman's Notebook," as it tells how a foreman got a 100 per cent. co-operation from his men in the wearing of safety goggles by merely asking a man not using them "What colour are your eyes?" and then producing a range of glass eyes and discussing their possible matching appearance. The article then goes on to detail the work done by the Factory Inspectorate in collaboration with representatives of the foundry industry and refers to the reports published in the Foundry Trade Journal. In this issue is also illustrated, in colour, a wide and very good looking range of safety shoes for both men and women.

Archibald Low & Sons, Limited, engineers and brassfounders, recently moved from Glasgow to new premises in Kirkintilloch. The company's Glasgow factory has been sold to Glasgow Corporation who want the land for redevelopment.

Book Review

Metal Fatigue. Edited by G. Sines and J. L. Waisman. Published by McGraw-Hill Publishing Company, Limited, 95, Farringdon Street, London, E.C.4; price 98s. 6d., post free.

As long as the most frequent cause of service failure of metallic components is fatigue, so long will there be a ready sale for new books on the subject. In their preface to the latest one, the editors make it plain that they have in mind the needs of engineers in designing machines for satisfactory life under conditions of repeated stress, and that they approach their task from the point of view of "know how" rather than that of "know why." However, first impressions are frequently important, and the conventional diagram of an edge dislocation with which the dust jacket is adorned can only be regarded as misleading, suggesting as it does the discussion of the fatigue process in terms of modern concepts. Let it be said at once that the index contains only one reference to dislocations, and that all attempts at explaining the "know why" of fatigue are left for others to make.

The book has been developed from a conference held at the University of California in 1953, and it is essentially a compilation of 17 separate chapters written by as many different authors. To review it adequately and concisely is difficult, for each chapter really calls for a review of its own, and even a list of chapter headings and authors would take up the available space. Chapter 2 gives a good general survey of the "Factors affecting Fatigue Strength," but the next one on "Basic Concepts of Fatigue Damage in Metals" can only be regarded as disappointing in a book first published in 1959. The treatment of metallographic changes caused by fatigue is superficial and somewhat dated; there is no mention of persistent slip lines, of "extrusion," of the experiments making use of surface removal to demonstrate the early formation of microcracks, or of the important work on sub-zero fatigue testing. Chapters 6 and 7, dealing with "Statistical Planning and Interpretation of Fatigue Tests" and "The Behaviour of Metals Under Complex Static and Alternating Stresses" are both very good. The next chapters deal adequately with residual stresses and with techniques of surface stressing to avoid fatigue, and thereafter the book is concerned primarily with aircraft applications. The chapters on cumulative damage and notch sensitivity will have a wider appeal, and many engineers will benefit from a study of "Estimation of Fatigue Life of Welded, Riveted and Bolted Structures." The final chapter discusses in an interesting way "Detection of Fatigue Damage" with special reference to aircraft structures.

From the engineering standpoint the editors have produced a comprehensive treatment of "Metal Fatigue," but one which would have been even more valuable if it were quite up to date. The absence of any mention of the International Conference on Fatigue held in London in 1956, and the fact that throughout the book there are but few references dated 1956 or later, suggest that the production of the book from the 1953 conference papers has taken too long. The effects of this are probably most noticeable in those chapters that touch upon the mechanism of fatigue, for it is in this field that advances have been most significant in recent years. In spite of these limitations, which could easily be removed in a later edition, the book can be recommended, for it brings together much of the information on fatigue most valuable to the engineer and presents it in a manner that should be widely acceptable. It is well illustrated and the general standard of production is good.

A. G. Quarrell.

FOUNDRY TRADE JOURNAL

EST. 1902

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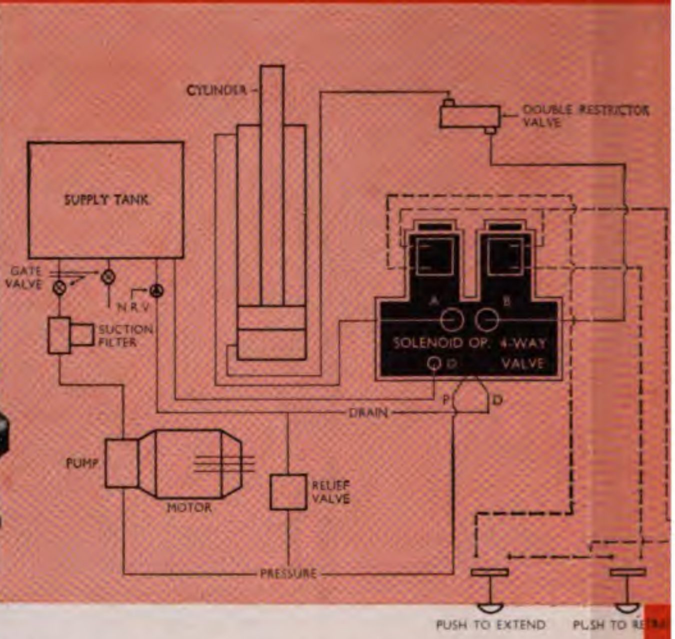

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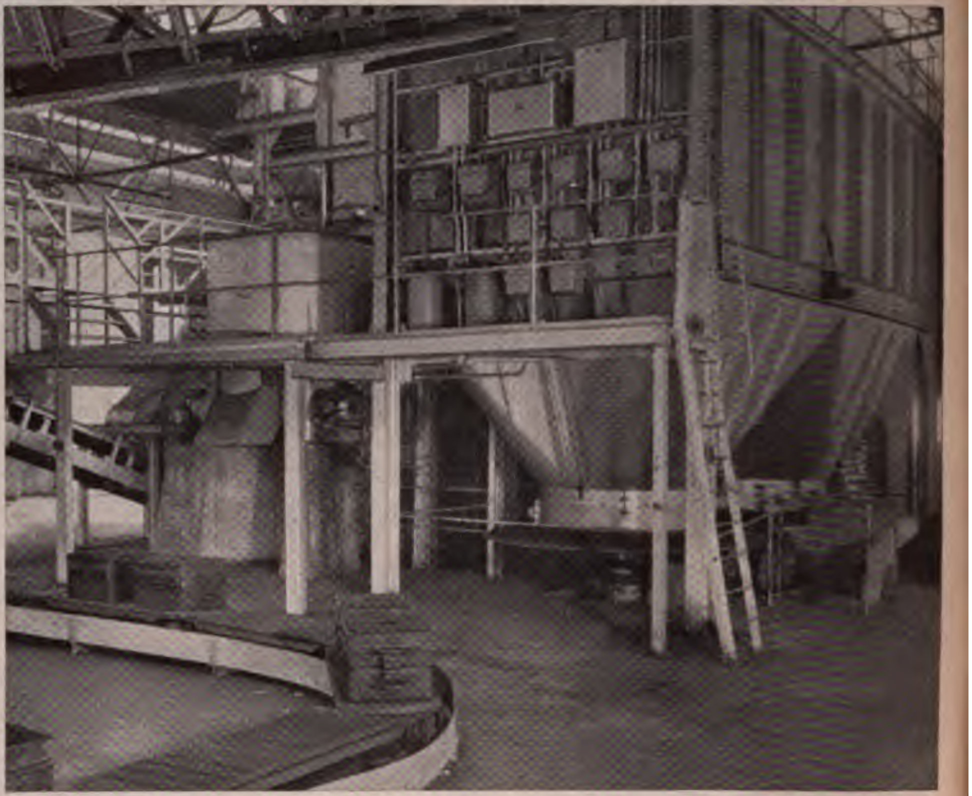

Photograph published by courtesy of Messrs. Shotton Bros. Ltd. Malleable Ironfoundry

Photograph shows: Two large storage hoppers with rotary table feeders, supplying reconditioned sand to belt conveyor; to bucket loader (with bifurcated chute) which charges two 2F size August-Simpson Mix-Mullers. Batch capacity of each Mix-Muller is 2,000 lb. Note the August Mould Conveyor in foreground.

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FOUNDRY
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The "Outer Seven"

We do not believe that either the foundry or its equipment industries will be notably and directly affected if the economic treaty covering Scandinavia, Switzerland, Portugal and this country, comes into being. Each year there will be a small but progressive lowering of imports, until at the end of ten years, a free-trade area will come into being. The main objective is probably a gambit for the game of international trade politics, as it provides a strong bargaining point for the eventual creation of total European free trade. The implementation of the arrangement will affect, in various degrees, the fortunes of the founders' customers, and so will have an impact on the output of castings, but it will take time.

From time to time, the UK foundry industry does sell castings to some of these countries. Malleable-iron automobile castings are being sent to Sweden, whilst conversely some of these are being imported from France into the UK. Historically speaking, raw castings have been received into this country from Switzerland, Belgium, Czechoslovakia, and even the USA. Indeed, before the 1914 war, malleable-iron fittings were quite an important item on the list of British imports, but they were "killed" by the creation of several large specialized foundries in Bedford, Ipswich and elsewhere.

UK foundry equipment and supplies concerns do reasonably well in the countries of the outer seven, especially in Scandinavia, but unfortunately for several of the more important firms, trade agreements with their American associates only accord manufacturing and sales rights for the UK and the Commonwealth. Thus one sees items of equipment of designs conventional in this country being supplied from European sources. The main competitors with this country for many types of foundry plant are Germany and the USA, and much equipment from these sources was supplied between the two wars; of purchases since then, British plant has commanded a reasonable proportion. The advent of the European Coal and Steel Community had a rapid and not too happy effect on Belgium due to that country's high labour costs, but we do not anticipate any great and immediate effect in the trading conditions of the signatories of the new "outer seven" agreement.

International Foundry Congress

Papers to be presented in Spain, October 4 to 10

At the International Foundry Congress to be held this year in Madrid, from October 4 to 10, the following papers are to be presented:—

"Porosity in Steel Castings," by O. Heide.

"Influence of Free and Combined Magnesium on the Structure of Nodular Graphite in Cast Iron," by E. Ross and E. Scheil.

"Centrifugal Casting of Iron Pipes with Lamellar and Nodular Graphite" by H. A. Nipper.

"Casting and Crystallization Problems in the Manufacture of Steel Castings," by B. Matuschka.

"Analysis of Belgian Research Results on the Correlation of Mass and Physical Properties of Grey Irons," by A. de Sy and J. Van Eeghem.

"Graphitization of Nodular-graphite Cast Iron by Annealing," by P. Rys.

"Vacuum Degassing of Grey Iron" by O. Necas and R. Kamensky.

"Mechanism of the Shotblasting Process for Steel Castings," by J. Pribyl and O. Starosta.

"Penetration of Low-melting-point Metals into Foundry Sand," by K. Fursund.

"Angles of Contact in 'Green' Moulding Sands and their Relation to the Technological Properties and the Hydration of the Clays," by J. Navarro-Alcacer.

"Influencing of Feeding Heads on the Cost of Metal for Castings," by D. Escorsa Civis.

"Segregation of the Alpha/Delta Eutectoid in Cu/Sn Alloys," by F. Joanxich.

"Results of Tests on Nodular Iron inoculated with Cu/Si/Mg Alloys," by F. Rodriguez-Yúfera and J. Orland, S. J.

"Study of the Factors which improve the Modulus of Elasticity of Castings," by A. Solé Amat.

"Ferro-alloys and Inoculants for the Production of High-strength Grey Cast Iron," by H. H. Wilder.

"Technical Vocabulary and the International Foundry Dictionary," by P. Huberson.

"Influence of Size and Quality of Coke in the Operation of the Cupola," by R. Loison, L. Soubrier and M. Decrop.

"Hydrodynamic Study: Fundamentals and Practice of Feeding Systems used for Castings made in Sand Moulds"—"The Case of Multiple Runners," by M. Jeancolas, G. Cohen de Lara and H. Hanf.

"Refining Irons with Oxygen and Powdered Lime—Result of Researches carried out by the *Institute de Recherches de la Siderurgie,*" by B. Trentini, P. Vayssiere, J. Francais and M. Allard.

"Behaviour of Moulding Material during Sudden Heating," by H. G. Levelink.

"Structural Changes of Aluminium/Magnesium Casting Alloys during Ageing," by L. G. J. van Ewijk.

"Manufacture of High-duty Iron," by N. G. Chakrabarti.

"Origin and Significance of Grain Structure in Sand Castings," by V. Kondic.

"Observations on Internal Tearing in Steel Castings," by I. Minkoff, C. W. Briggs and H. F. Taylor.

"Gases in Iron: Tests on Vacuum Degassing," by S. Gallo.

"Technical and Economic Study on the Contribution of Low-frequency Electric Induction Furnaces to the Modernization of Foundries," by A. Tagliaferri.

"Production of Sound Castings in Tin Bronze," by Matasaka Sugiyama.

"Manufacture of Blast-furnace Pig-iron for Nodular-graphite Cast Iron and the Resultant Properties of the Castings," by Isao Aoki.

"X-ray Film, using an Image Intensifier, of the Flow of Metals in Shell Moulds," by K. Shobayashi and K. Okamoto.

"Oxidation of Niobium," by T. Hurlen, H. Kjöllesdal, J. Markali and N. Norman.

"Researches on High-strength Zinc Alloys" by A. Krupkowski and W. Kajoch.

"Statistical Researches on the Influence of Foundry Processes on the Strength Properties of Separately-cast Test-pieces from Copper Alloys," by Z. Gòrny and A. Fijal.

"Study of Hot-tearing in Steel Castings," by K. Beckius, M. C. Flemings and H. F. Taylor.

Details of the programme for the Congress events were published in the April 2 issue of the FOUNDRY TRADE JOURNAL.

British Standards Institution

The British Standards Institution announces in its latest *Information Sheet* that new work is being started on austenitic steel pipes and tubes for pressure purposes; cast-iron gate valves for general purposes; components of heavy armoured conveyors used in mines; sanitary pipework and appliances (revisions of CP304 and CP305), and care and maintenance of floor surfaces. Amendment slips recently issued are for BS1121, Part 33:1955, Iron in ores, slags and refractories. Amendment No. 3, PD3435; and 1121 Part 35:1955, Aluminium in iron, steel ferro-alloys. Amendment No. 1, PD3436. Amongst the draft standards circulated for comment are CZ8551, Aircraft material 45-55-ton chromium corrosion-resistant steel (free machining, to replace D.T.D.525); CZ8589, Methods for the analysis of copper alloys, Part 6, tin (nickel coil reduction method); CZ8590, Methods for the analysis of copper alloys, Part 7, silicone (photometric method); and CZ8740, Methods for analysis and testing of coal and coke, Part 10, arsenic in coal and coke; Reprints now available include 2S100:1949, Inspection and testing procedure for aircraft steels (5s.) and S109:1949, Chromium/nickel heat-resisting steel (2s. 6d.); (both of these reprints have had amendments incorporated in the text of the standard).

Copies of these standards are from the sales branch of the Institution, 2, Park Street, London, W.1. When ordering amendment slips the PD reference should be quoted and not the BS number; draft standards can be obtained by subscribing members free of charge and to non-members the price of those listed above is 3s. 6d. per copy.

ISCOR (South African Iron & Steel Industrial Corporation) has won export contracts worth more than £7,000,000 in the past nine months. The most recent contract—valued at £1,000,000 from Japan—is for the supply of a large quantity of pig-iron to be delivered before the end of the year. Other countries to which exports are being made include the United States, Germany, Japan, the Argentine and the Philippines. Iscor's total export orders for pig-iron taken during the last nine months exceed 300,000 tons, and more than £4,000,000 in value. Orders for rolled-steel products, valued at more than £3,000,000, include a large order (worth about £750,000) for heavy rails from the Rhodesia Railways. Iscor recently installed a blast furnace—the sixth and largest at the works—at a cost of £3,500,000. This can produce 10,000 tons per week.

A Work in Progress

hensive Programme of Pure and Research for Iron Founders

A tour of inspection was recently made of the laboratories of the British Cast Iron Research Association at its headquarters, Bordesley Hall, Alvechurch, near Birmingham. Work in progress was explained by the staff, who demonstrated some of the special apparatus in use. Some of the more important work is reviewed below.

Shrinkage and Porosity

of iron castings is a subject of impor-
ry founder. Work which is relevant
ifacture of all grey-iron castings and
ite-iron castings is being carried out
h Cast Iron Research Association by
h reports to the Engineering Castings
tee and the Light Castings Sub-
An investigation originating from the
sinking under bosses, on light castings,
practical information of general appli-
light-castings foundries, and a new
t casting has become well established
. The influence of the mould upon
s been shown to be related to that of
perature, and investigations on these
s are continuing.

ucleation

the Association's findings on the
nfluence of eutectic cell number on
has been demonstrated that variations
e of nucleation of the iron may occur
o time in the foundry, and represent
the condition of the metal which may
shrinkage defects. As a result, the
have been asked to study these factors
foundries. Research is in hand to
ctical means for controlling the degree
n of the iron, and particular attention
n to methods of decreasing the degree
. These methods involve agitation of
he addition of titanium, and other
he Association is receiving active and
peration from a number of foundries
s is being laid on the practical appli-
he latest control techniques in the

of 2-in. dia. Bar Castings

undamental importance, the solidifica-
in 2-in. dia. bar castings is being suc-
estigated by means of the quenching
d work in hand covers the investiga-
nfluence of pouring temperature upon
tion sequences of various types of cast-
ork provides general background data.

ity

f the soundness of large castings is
out in a member's foundry as part of
ion of alloy-iron castings, and it is
e Association will obtain facilities for investigation of large engineering castings in other members' foundries. In this work the mould has been found to play a leading part in governing soundness, and the value of increased mould rigidity is being demonstrated. Following work on the effect of carbon content on the soundness of test castings it is believed that, if the mould is made sufficiently resistant to casting expansion, the increased expansion associated with an increase in eutectic graphite can be used to improve soundness instead of to expand the casting. Critical studies of the soundness of K-bar test castings have indicated that castings of complicated shape show uneven distribution of casting expansion due to the presence of a hot spot. This subject is of importance in rationalizing the influence of design factors in commercial castings.

White and Chilled Cast-irons

Work on white and chilled irons is reported regularly to the White and Chilled Iron Castings Sub-Committee of the Association. It has been shown that the chilling tendency of cast-irons is influenced to an important extent by the degree of nucleation of the grey-iron eutectic, and work is in hand to study the resultant chilling tendency when the degree of nucleation is modified by varying the composition and by physical methods such as violent agitation or inoculation. The influence of chromium in promoting chilling is being studied, and it has been shown that at least some of the effect of this element may be attributed to a decrease which it causes in the degree of nucleation. White irons may have either a ledeburitic or, less usually, a platelike eutectic structure. This alloy structure may have important properties, and experiments are in hand to find ways of producing it at will. Superheating and the control of sulphur and manganese are among the methods under examination. The ways in which the eutectic structures solidify are being investigated, and improved techniques for thermal analysis and quenching from small samples are being developed.

Grain Refinement of High-chromium Irons

Preliminary experiments have shown that coarse as-cast grain-size in high-chromium irons may be avoided by melting and pouring at low temperatures, and that grain refinement can be brought about by the addition of titanium or nitrogen. Further work is envisaged to assess the relative amounts of titanium or nitrogen necessary to bring

Measuring metal temperature at the spout, in a BCIRA member's foundry.

about grain refinement at various melting and pouring temperatures. It is also proposed to investigate the influence of section size on the as-cast grain-size.

Foundry Sands

The Sands and Refractories Sub-Committee receives regular reports on the progress of foundry sand research. CO_2-process sands are being studied in some detail. Moulds made by this process produce castings of improved soundness. However, metal penetration is a problem experienced by some foundries, and a programme of work is being devised to cover a full investigation of this defect both at the Association and in members' foundries.

Shell Moulds

The room-temperature properties of shell moulds have been studied at the Association, and some future work concerns the preparation and heating of test-pieces to investigate the high-temperature properties of shell-moulding materials. The Association's original high-frequency heater proved to be inadequate for this work, and new equipment has been developed which is believed to be more advanced than any other of its kind in the world.

In conjunction with the study of the soundness of iron castings, there is an extensive study being undertaken of the properties of green-sand and other moulds. Although cement and CO_2-process moulds give castings of improved soundness, it is believed that there is a great demand for improvement in the soundness of castings made in green-sand moulds. The investigation covers the effects of additions to green-sand, and the use of high-pressure techniques to improve what has been termed the "rigidity" of such moulds.

Cast-iron for Steam Engineering

The present limiting temperature of 450 deg. F. (232 deg. C.) for cast-iron in many steam applications is considered to be too low, and a temperature of 650 deg. F. (343 deg. C.) is thought to be more realistic. A large programme of work on growth has been completed, and further work on creep is in progress to obtain data which it is hoped will lead to an increase in the limiting temperature for cast-iron for steam applications. This programme of work includes:

(*a*) Growth tests in air at temperatures up to 500 deg. C. for times up to 64 weeks.

(*b*) Growth tests in steam at temperatures up to 427 deg. C. for times up to 49 weeks.

(*c*) Short-time high-temperature tensile and impact properties up to a temperature of 600 deg. C.

(*d*) Creep tests.

In the growth tests already completed it has been shown that cast-iron is not subject to growth at temperatures of 400 deg. C. and below in air or steam atmospheres. The results are considered very satisfactory and indicate that, as far as growth is concerned, the limiting temperature for cast-iron could safely be raised to 343deg. C. and still allow an ample margin of safety, since growth does not occur at temperatures of 400 deg. C. and below. Long-term growth tests

Member of the BCIRA staff counting eutectic cells.

of furnaces, at Bordesley Hall, for growth testing at low temperatures.

rogress at 400 and 350 deg. C. in air, to see
sure for many years causes any deterioration
perties that is not detected in the tests of
eks' duration.

Data are needed

le the growth tests are considered satisfac-
the present limiting temperature for cast-
ill not be raised in this country unless creep
re also available. To supply these data six
Denison T.45 creep machines have been
ed, and tests have been in progress for some
These tests are being carried out on an un-
d flake-graphite cast-iron at temperatures of
nd 350 deg. C. This material has already
satisfactory growth resistance, and if it is
ound to have satisfactory creep properties it
render unnecessary a great deal of work in
cast-irons, which might be assumed to have
or creep properties to the unalloyed iron.
creep tests are carried out on a 5,000-hr.
and stress *versus* log time curves are being
ed at the two temperatures to give the
er the data required.

Mechanical Properties

rogramme of work is under way to correlate
ic cell size with mechanical properties, and
to test relationships between the various
rties established by other workers. The effect
sphorus on tensile strength, Brinell hardness,
lus of elasticity and stress/strain properties
een investigated in detail.

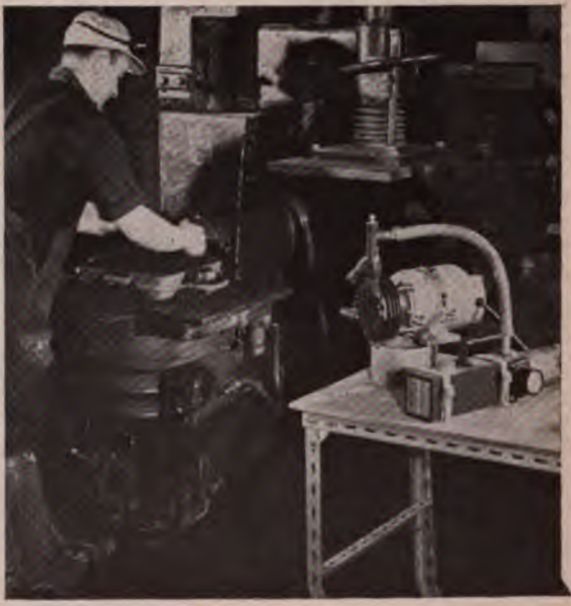
-strain Curve for Cast-iron

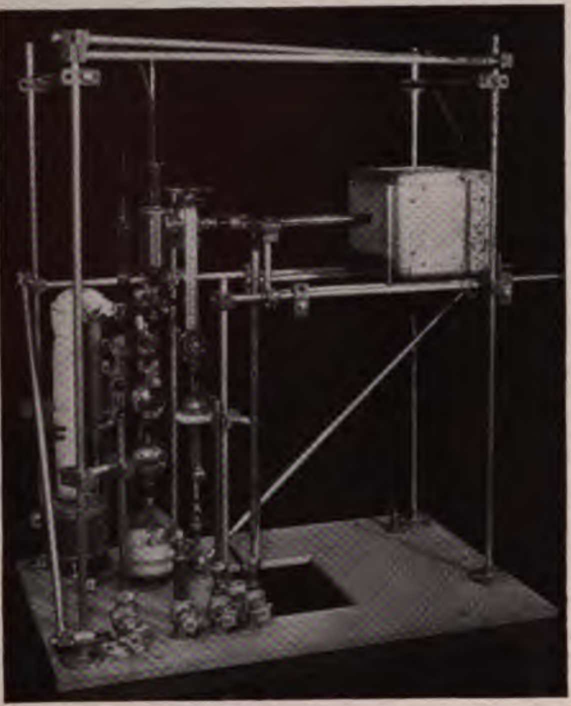
stress/strain curve for cast-iron in tension
compression is undergoing comprehensive
nation. This work has already indicated that in tension the graphite present might be considered as a void in the matrix, and under stress the shape of the void is changed, resulting in an increase in volume of the cast-iron as a whole. The strain which occurs under tensile stress is due to elastic and plastic deformation of the matrix, and also to the enlargement of voids created by graphite flakes. The recoverable strain characteristics of cast-iron depend on the extent to which the voids, created under stress, recover on unloading. Fatigue tests carried out on a routine basis will provide additional data on cast-iron.

Malleable Iron

Reports on matters relating to malleable iron are reviewed by the Malleable Castings Sub-Committee. Present work includes the determination of means of obtaining optimum mechanical properties in blackheart malleable iron. The influence of silicon content and of phosphorus content on the tensile, bend and unnotched impact properties has been assessed on laboratory materials which were annealed commercially. These tests have been extended to obtain similar data on representative materials which have been annealed in inert atmospheres to eliminate effects due to surface carbides, decarburized ferritic rim, and pearlitic rim. The influence of silicon, carbon and phosphorus contents are studied. The mechanical properties of normalized and spheroidized pearlitic malleable iron are being assessed, and also the effect of quenching and tempering treatments on the tensile and impact properties of these materials. With the aim of improving the tensile properties and annealability of ordinary blackheart malleable iron,

Hexhlet dust-sampling apparatus in use in the BCIRA experimental foundry. In this case the Hexhlet is driven by a portable vacuum pump.





BCIRA apparatus for the determination of hydrogen content in cast iron by vacuum-heating.

experiments are in hand to show that bismuth/boron additions may be successfully used to obtain as-cast material, of relatively high silicon content, which is completely white in fairly heavy sections. Continuing work is concerned with determining whether these materials anneal satisfactorily, particularly in thick sections.

Specification for Pearlitic Malleable

A British Standard Specification for the properties of pearlitic malleable iron is under consideration. Although tests already carried out give extensive information, and are more or less complete in themselves, it is envisaged that more co-operative work of a similar nature between the Association and the malleable industry will be required, before an agreement is reached between producer and consumer on the precise requirements of the final specification.

Ingot-moulds and Bottom-plates

The Association continues to co-operate with the British Iron and Steel Research Association in its studies of ingot-moulds and bottom-plates, and current work includes a study of the structures of ingot-moulds to determine the variations of structure within a single mould, or from mould to mould of a number of moulds. The Association provides a considerable amount of assistance to ingot-mould foundries in their day-to-day problems. Work for one group of foundries, and for the steel company to which they supply ingot-moulds and bottom-plates, covers a wide investigation of the soundness, lives, premature failures, and metallurgy of these castings.

Gases in Cast-iron

A great deal of work has been carried out on the causes and cure of pinhole defects in cast iron. It has been shown that these are seriously promoted by the introduction of aluminium into the iron. In recent months the occurrence of pinholing, arising from the use of aluminium in high-manganese pearlitic malleable iron, has been dealt with in a number of foundries. The use of boron as a substitute for aluminium in this material is under test, and alternative additions are being sought. The work includes the effects of other trace elements in ferro-silicon upon pinholing, and extensive study is being made of specially prepared pure addition alloys with controlled minor-element contents. This programme of work utilizes the Association's vacuum melting and casting furnace, using both vacuum and protective atmospheres. The effects of ferro-silicon and other addition alloys containing various trace elements upon chill removal, mechanical properties and eutectic cell number are to be investigated in detail.

Hydrogen Treatment of White Iron

It has been demonstrated that the hydrogen treatment of white iron of malleable composition prior to casting reduces the time of subsequent annealing, provided that the residual hydrogen content is low. This investigation is to be extended to cover a wide range of hydrogen contents both before and after casting, and attention will also be paid to a range of sulphur contents to determine the interaction between hydrogen and sulphur under these conditions. The effects of prior heat-treatment on subsequent annealing rate are being investigated, with special reference to the effects of hydrogen during prior heat-treatment.

Chemical Analysis

The first part of a handbook giving methods recommended by the Association's Methods of Analysis Sub-Committee has now been published. Part 1 refers to cast iron and pig-iron, and subsequent parts will deal with the analysis of alloy irons, ferro-alloys and slags. This year, methods for austenitic and acicular irons, nodular graphite irons, Vantit pig-iron, ferro-chromium, ferro-molybdenum, mischmetall and nickel/magnesium alloys are being examined in collaboration with the Sub-Committee. The Sub-Committee is also examining a rapid method for magnesium published by the analytical section and this will be submitted to the British Standards Institution as a standard method.

Trace Elements

The metallurgical significance of trace elements has become of increasing interest recently, and this has led to the development of methods capable of determining amounts of elements from 0.001 to 0.00001 per cent., or even lower. These methods usually employ instrumental techniques such as polarography, absorption spectrophotometry or hotometry. A previous chemical separation ally employed and this is frequently based ent extraction, although ion exchange and pitation are sometimes used. At present estigator is examining methods for boron ium. The determination of trace elements r a high degree of skill on the part of the high-quality reagents, spotlessly-clean us and careful attention to detail. In some e lower limit of the method is determined y the purity of available reagents than the ty of measuring apparatus. A committee stigate ways and means of obtaining purer has been formed and the Association is ted on this.

Slag

g the past few years, the analysis of cupola been revolutionized by the employment of extraction, spectrophotometry and com- tric titration. A complete analysis now ly four to five hours. Ultra-rapid methods a and lime are now under consideration. tive recording flame-photometer built at rch may be applied to slag analysis.

Spectrographic Research

Spectrographic Department, which deals e routine analysis of some 19 elements in so carries out research work on the exten- spectrographic techniques to other ele- nd materials. An important project is the aphic analysis of slags. A solution method n established which will give the analysis slag components in 45 minutes. A series dard slags has been prepared synthetically ure oxides and these have been used to e the spectrograph. It is hoped to obtain ytical accuracy of ± 3 per cent. of content technique. The Department is continually to improve the detec- d measurement of trace s in iron and steel.

Cupola Research

wing the installation of cupola plant an exten- gramme of research is lanned under the guid- the Fuels and Furnaces mmittee. The new plant lly described in the Y TRADE JOURNAL of , 1959.

rrosion of Cast-iron

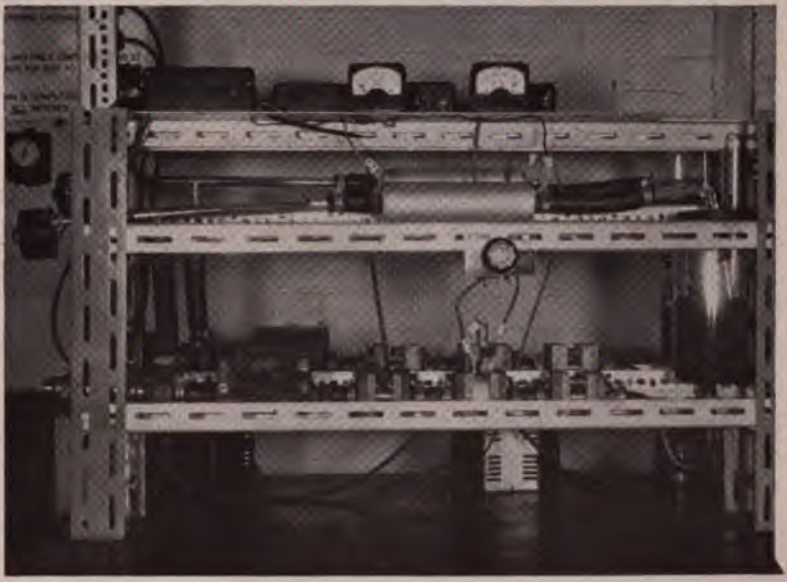
ctivities of the corrosion are concerned with three spects of corrosion, two of which are involved with relatively long-term investigations, while the third is concerned with solving members' problems submitted on a day-to-day basis. In the course of this "trouble shooting" a very wide variety of problems is encountered, ranging from the corrosion of cast iron by natural waters to the corrosion of cast iron used in the manufacture of industrial alkalis, acids and salts. Many of these problems require small-scale investigations to be specially initiated. Two lines of long-term research which have been pursued in recent years are concerned with the problem of pitting of cast-iron ship-propellers, and the excessive corrosion of cast-iron road-vehicle cylinder-blocks and -heads by anti-freeze solutions.

Pitting of Ship-propellers

Work has shown that most of the cases of the rapid deterioration of cast-iron propellers in service could be countered by the use of magnesium anodes secured to the butt-end of the tail-shaft of the ships. In a few cases, however, this remedy has not been found effective, apparently because of the difficulty of insulating the propeller from the hull. As an alternative to cathodic protection the available propeller-coating materials are being studied. A more detailed study is also being undertaken of the mechanism of the cathodic protection process, in order to establish the degree of protection required by individual ships.

Corrosion by Antifreeze Solutions

The problem of corrosion of cast-iron cylinder-blocks and -heads in antifreeze solutions in certain heavy road vehicles has recently become serious, because of the danger of the corrosion products blocking the radiator matrices and causing overheating. The Association has carried out field tests in order to define the problem, and a rig has been constructed to simulate conditions in which antifreeze is used. It has been shown that



f apparatus for studying n of cast iron by anti-freeze solutions.

Prototype bifurcated h
studying up-draught ve
of foundry knock-o

corrosive conditions arise because of the simultaneous depletion of the corrosion inhibitors from the solution and the oxidation of the glycol to formic acid. Work is being done to establish more clearly the mechanism of the oxidation of the glycol, and it is hoped that data will eventually become available from which a more universal inhibitor system for road-vehicle engines may be developed.

Enamelling of Cast-iron

An investigation into the effects of various types of shot-blasting grits on the occurrence of enamel boil defects has been initiated in collaboration with several member companies. Experiments have been carried out in hand-blast cabinets at various plants, using several types of grits. Visual examination of specially prepared test-plates, and also actual hollow-ware castings, has indicated that after shotblasting considerable differences in surface appearance occur from plant to plant, in spite of the fact that all are intended to be suitably cleaned for subsequent vitreous enamelling. Microscopic ex-
amination of sections c
the test plates and cast
shown considerable di
in their surface properti

Mechanical Grading of

Mechanical grading
grits has shown that tho
produce rough and d
surfaces have a high pe
of particles retained on
16-, 18- and 22-mesh
Those grits giving a c
tively smooth and unc
surface contain large pe
on the Nos. 44-, 60-, 1
150-mesh sieves, with o
small amounts on the 1
and 22-mesh sieves. Th
been possible to corre
degree of enamel boil a
hole defects occurring u
range of grits studied.
containing a large perce
fine material have been
give less susceptibility
and pinhole defects tha
containing a high perce
coarse particles. These
have already been appli
industrial plant, and a r
in the percentage of scra
by boil and pinhole de
been deported.

Slag and Dross Defe Cast-iron

Research is being carried out on the eli
of slag and dross defects in cast-iron. Thes
are difficult to classify and have entailed
velopment of new techniques in the iden
of foreign material entrapped in castings.
use has been made of the petrographic mic
Results of this work have already shown
portance of ladle refractories and cupola
materials, the latter usually being overlo
regarded as unimportant. A low-fusion-
ture botting-clay has been shown to caus
defects, due to entrapment of fused dros
metal stream.

Static and Dynamic Strain Measuren

Apparatus has been acquired and a t
developed for the measurement of strain
static, or rapidly changing stresses, by th
electrical-resistance strain-gauges. Strain
low as 10⁻ (which in a normal engineer
iron represents a stress of approximately
per sq. in.) can be measured, and alternatin
at frequencies up to 200 cycles per secon

and recorded. It is hoped in the near
develop the apparatus to detect stresses
ng at much higher frequencies. The
s is at present being used to investigate the
y of stress relief by vibration at room
ure.

Foundry Operations Section

ection was, until recently, known as the
nal Research Team, and as such was
in June, 1950. Its function is to provide
oundry industry with an advisory service
uction efficiency, and general problems
ing to productivity. The department con-
small group of people, with a wide prac-
erience in the foundry industry, who
in production problems.

Foundries

gh problems can be dealt with by corre-
e it is normally necessary to visit the
and this can be done at the request of the
erned. The scope of the work carried out
ide and varied, depending on the type of
submitted. In some cases it is necessary
a general survey of a foundry, in which
ections are carefully examined so that a
plan of development for the future may
lated. Most of the visits, however, are
with specific problems of diverse
including the layout of entirely new
the development of mechanized units
hine or sand-slinger moulding, cupola
core production, scrap control, and so on.
sually occupies two days, but a longer
be arranged if the problems justify it.
embodying the findings is provided after
and the whole service is strictly confi-
Considerable importance is attached to
n flow-lines, and particular attention is
given to the routing of materials to and
also within, the foundry. The Section
concerned with handling problems, and
h the use of mechanical aids, and fully
d equipment. When necessary, schemes
anized layouts are developed, and dia-
sketches prepared to depict the ideas.

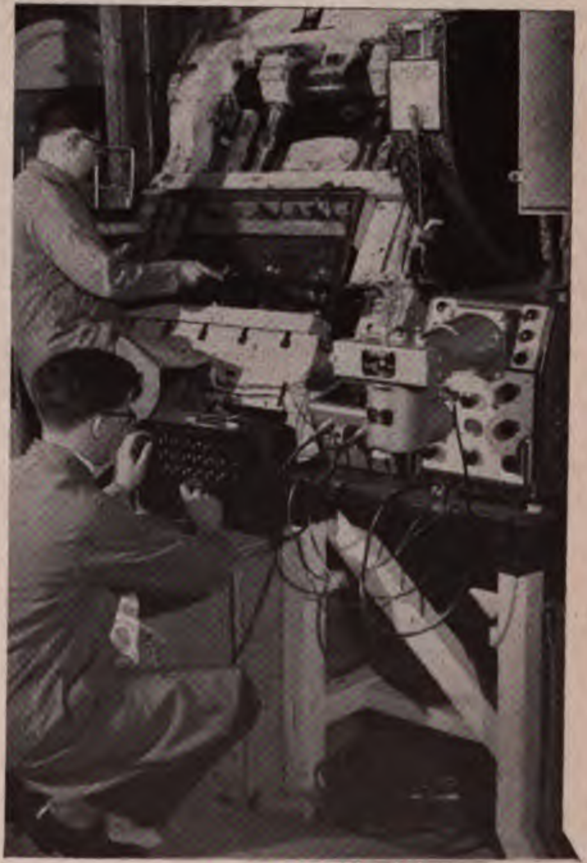
notion"

ts work the Section is making increasing
thods engineering principles, particularly
layout problems. Considerable interest
displayed in a form of time-lapse cine-
hy known as "memo-motion." The
as acquired the necessary equipment for
ique, and the scope of its activities has
greatly increased. After initial trials, it
vident that memo-motion has much to
means of "sampling" production proce-
is technique is now available to any
rm whose problems warrant its use.
otion" is also being used as a basis for
vestigations and certain aspects of pro-
mmon to many foundries are being ex-
ith the object of comparing and analyzing
s techniques *employed.*

Foundry Atmosphere Section

The Foundry Atmospheres Building has only recently been completed, at a cost of some £25,000, and was officially opened by Dr. J. G. Pearce on May 28, 1959. It provides workshop and laboratory facilities for the Association's experimental programme on foundry atmospheres, and also houses the team of investigators. In the past, the experimental work carried out by the Foundry Atmospheres Section has been largely concerned with devising methods of dust control for foundry operations which involved the formation of concentrated dust plumes. Knocking-out, grinding, wire brushing and bar de-coring are typical examples, and the work done has led to the successful introduction of new designs of equipment. The Section is equipped with dust-sampling and measuring equipment, and it is intended to carry out surveys of foundry atmospheres to determine the extent of the dust hazard, and to establish the sources of air-borne dust and methods by which it can be controlled. In addition to the above programmes, the Foundry Atmospheres Section carries out a number of *ad hoc* investigations of members' problems relating to ventilation and dust control.

BCIRA research staff studying stresses in a machine, using strain gauges.



Knock-out Equipment

Laboratory-scale investigations are now in progress on the design and performance of foundry knock-out equipment. Following earlier work on down-draught designs, particular attention is now being paid to the use and efficiency of side-draught and up-draught principles. Some attention is also being paid to the general principles and design of fettling benches, and these will be constructed and studied for a wider range of conditions than are covered by existing equipment.

"Bronze World"

The illustration shows a war memorial to the Commonwealth Air Forces which was unveiled by Her Majesty the Queen during her recent visit to Green Island, Ottawa, Canada. The memorial takes the shape of a globe "framework" executed in extruded metal, with solid cast-bronze land-masses superimposed. The globe, with vertical centre axis, stands on a bronze plinth embellished by three statuettes of beavers, again in bronze. The whole construction is surmounted by a bronze eagle which has a wing span of eight ft. This work of art was produced by the united efforts of Birmingham Guild, Limited, and McKechnie Bros., Limited, both of Birmingham.

Hungarian Non-ferrous Research

Volume II of the proceedings of the Hungarian Research Institute for Non-ferrous Metals has just been published and among the 20 communications contained in its 250 or more pages are two which concern the foundry industry. Brief synopses of these are as follow:—

Use of Pre-heated and Gas-pressured Feeding in the Casting of Non-ferrous Metals, by Gy. Emöd and L. Tóth.

The practical application of preheated and gas-pressured feeder heads. When experimenting with preheated feeder heads, it was found that the most reliable way for heating is by using a heating ring. The use of powdered heating mixtures was found unreliable, a heating cartridge put into the riser being more reliable. When experimenting with gas-pressured heads, a suitable gas-developing material was found, for casting temperatures below 700 deg. C., in the form of a mixture of sawdust and resin, or elementary sulphur. For temperatures higher than 900 deg. C., chalk powder or dolomite may be recommended. When using dried moulds, the gas-pressured head must be used simultaneously with a cooling cap. According to the economic calculation, a considerable saving may be attained by using the above methods.

Effect of Additional Elements on the Grain-size and Cracking of cast Al/Mg/Zn-type Alloys, by Z. Buray.

Investigation by the ring-casting tests of the macroscopic structure of cast Al/Mg/Zn-type alloys. In the case of the ternary alloys, it was found that increase of the Mg content results in a more drastic reduction in the grain size and the cracking tendency also, whereas increase of the Zn content has a negligible effect. When investigating the effect of further additions to the Al/Mg/Zn alloys, it was found that Fe and Si, each up to an amount of ½ per cent., exert a negligible effect on the macroscopic structure. When present in an amount of 1 per cent., however, they have a great effect on the grain refinement and the reduction of the cracking tendency. Cu up to 1 per cent. coarsens the grains and impairs the cracking resistance. Ti, in an amount of more than 0.3 per cent., and B, more than 0.1 per cent., are strong grain-refiners and reduce considerably the cracking tendency. A high Fe:Si ratio, for example (Fe+Si)=0.5 per cent., refines better than a low Fe:Si ratio. Simultaneous additions of Ti and B have a strong grain-refining effect and reduce the cracking. The temperature of casting has a greater effect on both properties investigated and the cooling rate and gas content exerts an improving effect. Although the cracking tendency of cast materials depends on several factors, there is an interesting relation between the grain-refining action and the alteration in the cracking tendency.

Copies of these papers (in Hungarian) are available on loan on application to the Editor of this JOURNAL.

ACCORDING to *Modern Castings*, the American Brake Shoe Company, of Mahwah, New Jersey, is making steel castings to give 125 ton per sq. inch in ultimate tensile strength; 104 tons per sq. in. yield point and 5.5 per cent. elongation. The castings are made for the aircraft industry and weigh 250 lb.: are 36-in. dia. and cu. of 0.125 in. section. Ceramic moulds are used for their manufacture.

American Letter

Steel Castings in Nuclear Power Plants*

se of stainless-steel castings in high-pressure, perature nuclear-power plants is increasing. was confirmed by users and producers attend- recent Heat and Corrosion Resistant Alloy Conference, held at the International Nickel ’s Harbor Island test station, Wrightsville .C. The major advantages of these castings ability of complex shapes, and high-temperature Typical of the various installations described onference were the following:—

Shippingport Power-station Pump

Shippingport atomic-power station recently put tion by the Duquesne Light Company, the ouse-designed pressurized water-reactor has nary coolant loops, each of which includes n stop valves and a large, complex, double- ımp-casing. This 3½-ton pump casting is made ype CF-8 alloy (0.08 max. C; 1.50 max. Mn; Si; 0.04 max. P; 0.04 max. S; 18 to 21 Cr, 11 per cent. Ni). The 18in. valve bodies, ıst have a high degree of reliability, are also ype-CF-8 alloy.

Volute-pumps for Reactor-plants

cast-stainless volute-pumps, about double the f similar units in the Shippingport reactor, ısed in the Yankee Atomic Electric Company lass.), and Con Edison (Indian Point, N.Y.), ed-water reactor-plants. Each of these type- on pump casings will have a capacity of ıll. per min. As in the Shippingport plant, he primary loops of these newer installations ontrolled by cast-stainless valves.

Pump for Liquid Sodium

Edison’s Enrico Fermi nuclear-power plant, ler construction at Monroe, Michigan, will pump cast of type-CF-4 (0.04 max. C; 1.50 ; 2.00 max. Si; 0.04 max. P; 0.04 max. S; 17 to nd 8 to 12 per cent. Ni) or CF-8C stainless 8 max. C; 1.50 max. Mn; 2.00 max. Si; 0.04 .04 max. S; 18 to 21 Cr; 9 to 12 per cent. Ni, C min.—1.0 max., or Cb-Ta 10 × C min.—), to handle liquid sodium at 800 to 1,000 This will be the first fast-breeder-reactor ation power-plant to utilize liquid sodium as change medium to generate steam.

Elbow for SPERT-III Reactor

led for use in the SPERT-III reactor (Special cursion Reactor Test III) is a 16-in., 90-deg. ade of ACI-type CF-4 cast-stainless alloy. It h-temperature yield-strength that is 20 per cent. ıan that required by the code for unfired vessels. Many fittings cast of this alloy are he bottom of the SPERT-III pressure vessel, ontains two 16-in. inlet-cooling-water lines. eterogeneous, thermal reactor the pressurized- plant makes two passes through the core with ım flow rate of 20,000 gall. per min.

CF-8C Impellers

s from some equipment builders indicated or improved materials to handle liquid-metal Apparently under certain conditions, sodium, the important heat-transfer media, extracts carbon from stainless-steel. However, a technical expert from an important pump-building firm reported that his company had made, and successfully tested, pumps with impellers cast of type CF-8C (containing columbium), for handling liquid sodium around 950 deg. F. This latter company is now designing an all-cast-stainless pump (both impeller and casing) of type CF-8, to handle uranyl sulphate.

Some users expressed the desire for alloys stronger than those now used in pressurized water reactors oprating in the 600 to 1,000 deg. F. range. Several answers to this problem were suggested, including the use of high-carbon partially-ferritic alloys, such as ACI-type HE (0.20 to 0.50 C; 2.00 max. Mn; 2.00 max. Si; 0.04 max. P; 0.04 max. S; 26 to 30 Cr; 8 to 11 Ni, and Mo 0.5 per cent. max.).

All those present at the conference agreed that there was no doubt of the bright future for cast-stainless alloys in nuclear power-plant construction.

Machinability of Grey Cast-iron*

Common types of unalloyed cupola-melted grey cast-iron were studied, to determine how changes in some of the major constituents of their microstructures affected machinability. This study made use of lineal analysis, a quantitative method of classifying micro-structure. Using this method, numerical values were obtained for: (*a*) Relative volume of pearlite, (*b*) Relative volume of graphite. (*c*) Relative size of the graphite flakes. The results of the study showed that an increase in machinability rating was obtained by: (1) A decrease in the relative volume of pearlite. (2) An increase in the relative volume of graphite. (3) An increase in the relative size of the graphite flakes.

The test-bars used were unalloyed, and ranged in carbon equivalent from 3.90 to 4.50, and in tensile strength from about 8.9 to 17.8 tons per sq. in. The machinability indices for the study were obtained from constant-pressure lathe tests. These tests were based on the fact that materials of different machining qualities cut at different rates when surface speed, depth of cut, and tool geometry are held constant, while a fixed lateral force is applied to the tool.

More Machine-tool Orders

Orders for machine tools in America continued to improve for the fourth consecutive month, according to figures published by the National Machine Tool Builders' Association (see Table 1). The net total of new orders was nearly twice as great as a year ago, but still substantially short of the 1957 level.

TABLE 1.—*Net New Orders for Machine Tools.*

(Thousands of dollars.)

	1957.	1958.	1959.
	$	$	$
January	75.500	26,850	41,050
February	71,900	28,300	45.500
March	72,750	36,150	51,550
April..	64,300	28,300	53,450

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t from an article in the May issue of *Industrial*

* Synopsis of a paper, by W. W. Moore and J. O. Lord, presented at the AFS Congress in Chicago (April 13 to 17). W. W. Moore is principal metallurgist, Process Metallurgy Division, Battelle Memorial Institute, Columbus, Ohio. J. O. Lord is Professor of Metallurgy, Department of Metallurgical Engineering, The Ohio State University Columbus, Ohio.

Company News

Morgan Crucible Company, Limited—There is to be a scrip issue capitalizing £1,762,268 of reserves on the basis of two-for-five in £1 "A" for the "A" holders and in £1 "B" for the "B" holders.

Thos. Firth & John Brown, Limited, steelmakers, of Sheffield—A one-for-four scrip issue is announced. The directors intend to maintain the final dividend at 6 per cent. on the capital as increased by the scrip issue.

Craven Bros. (Manchester), Limited, machine-tool makers, etc., of Reddish—Suggestions by the chairman of another company were made for some form of association, possibly involving a merger, but it was decided that there could be no useful form of association.

Triplex Foundry, Limited—Issued share capital of R. A. Roobottom, Limited, Walsall Sheet Metal Company, Limited, and Vernier Tool & Gauge Company, Limited, all Walsall companies specializing in presswork and sheet-metal fabrication, has been acquired for a total consideration of £28,000.

English Electric Company, Limited—Interim of 3 per cent. is being paid for 1959 on capital increased by one-for-10 rights and one-for-two scrip issues. The previous year's interim, allowing for the capitalization, was equivalent to 2¾ per cent. on the present capital and the total payment equivalent to 9¼ per cent. It is stated that the rate of the present interim carries no implications as to the total payment.

Woodall-Duckham, Limited, contractors for gasworks, carbonizing plants, coke ovens, etc., of London, S.W.3—The company has acquired the whole of the share capital of Nordac, Limited, manufacturers of chemical plant, of Uxbridge (Middx), by the issue to Nordac shareholders of 185,189 ordinary shares of 5s. each in Woodall-Duckham. Nordac will continue to operate as a separate company within the Woodall-Duckham group.

Dowty Group, Limited—The chairman, Sir George Dowty, says that a reduced demand has been experienced from the National Coal Board and sales of mining equipment are now only one-third of what they were 18 months ago. He adds: "If coal is to compete with oil and other fuels, production and distribution costs must be reduced. The irony of the situation is that our mining equipment can reduce the cost of coal-getting considerably."

H. & J. Hill (Willenhall), Limited ironfounders, etc.—In deciding to reduce the interim dividend from 7½ per cent. to the 5 per cent. on account of 1959, the directors state that they have taken into consideration the recession which took place in the industry early this year and which automatically affected the company's profits. The present position shows a considerable improvement which, it is hoped, will continue, it is added. A total dividend of 25 per cent. was paid for 1958.

Holman Bros., Limited, founders, mining, and pneumatic plant specialists, of Camborne—Firm orders received during the first six months of this year showed an increase of about 25 per cent. on the first half of the previous year. Anticipating that profits will benefit, the company is maintaining the dividend at 12 per cent. for 1958-59. A fall in home sales is largely attributed to a reduction in sales to the National Coal Board. Group profits, before tax, were £218,385 (£461,633) and the net profit amounted to £119,386 *(£221,429).*

Law Cases

Judgment "With Regret"

Giving judgment for the defendants, the
side Foundry & Engineering Company, L
Judge Ernest Ould, at Sheffield County Court on
day, August 13, said he did so "with regret.
had heard a claim for damages brought by M
Hunter, who said that he had fallen and brol
ankle when returning to his machine. His le
touched one of a pile of bars and caused
stumble towards holes in the factory floor.

A witness alleged that the holes in the floor,
had been there for four or five years, were fi
between a week and a fortnight after the a
Judge Ould said his difficulty had been to
whether there was sufficient proof that the hol
anything to do with the accident.

Women Working Machines

Where women worked machines which
potentially dangerous, it was the employers
to see that someone was at their elbow whe
work was altered from one machine to anothe
Mr. Justice Paull, giving judgment at Sheffield
on June 29 in an action brought by Mrs. Olive
ing (33) against British Ropes, Limited, Do
The plaintiff was awarded £2,000 and costs for
received when working a wire-stranding machine
company's Retford factory.

It was stated that Mrs. Fielding was told to
machine she had never operated before. She a
it was similar to the one she had left, but
operated by press buttons instead of a hand
started immediately. On behalf of the company
stated that the plaintiff had had instructions in
of the machine 18 months earlier.

The judge said that because of the acciden
Fielding was now virtually one-handed. He
prepared to find that she was so deliberately ne
that her damages should be diminished.

North British Locomotive Chang

Retirement of Mr. T. A. Crowe, chairma
chief managing director, from the board
North British Locomotive Company, Limited,
gow, brings two recently appointed board m
to the head of the company. Mr. Thomas Co
is the new chairman and Lord Reith is ap
vice-chairman.

Mr. Coughtrie, who joined the board some
ago, founded and is a director of the Belmos
pany, Limited, colliery and industrial swi
manufacturers, of Bellshill (Lanarkshire). H
only 23 when he founded the company in 1
has since grown and now has branches in Dund
London. Lord Reith, whose appointment as a
tor was only announced last week, is also a d
of Tube Investments, Limited, Chesterfield
Company, Limited, the British Oxygen Co
Limited, and a number of other companies.

Increases in Capital

Rapid Magnetic Machines, Limited, Birmingham, i
by £80,000, in £1 shares, beyond the registered ca
£50,000.

Heat Treatment & Brazing Company, Limited, London
increased by £10,000, in £1 ordinary shares, beyond th
tered capital of £10,000.

Jessop-Saville, Limited, steelmakers, ironfounders,
Sheffield, increased by £1,158,000, in £5 shares, bey
registered capital of £600,000.

ıperature-control Methods in the t-treatment of Aluminium Alloys

By G. Fitzgerald-Lee, F.R.Econ.S., M.I.E.I., A.R.Ae.S.

The best plant in the world is useless without accurate temperature control, which is fundamental to heat-treatment processes. As it is so important, it is helpful if the underlying principles are known to the works' personnel connected with heat-treatment. Although the following article is written particularly for founders engaged in treating aluminium alloys, many of the remarks are, of course, equally applicable to the processing of other cast metals.

tric equipment supplied by reputable
robust and reliable; periodic maintenance
vice engineer is normally provided, and
vice is available from the manufacturers.
is should be thought of as being supple-
o the regular maintenance carried out by
's technical staff responsible for the heat-
operations.

HERMO-ELECTRIC COUPLE

gh liquid- or vapour-pressure thermo-
ay be employed at the low temperatures
for precipitation treatment or stress relief,
neter most commonly used for light-alloy
ment is the thermo-electric couple. This
r than the electric resistance pyrometer
occasionally employed. Pyrometers may
as indicators only, as recorders or con-
r as combinations of these. In oil or salt
nperatures are often controlled by bimetal
ats. But no matter which type of instru-
ised, the hot end must be so placed as to
the temperature of the metal rather than a
the furnace. Where, as in standardized
the pyrometer is situated comparatively
rom the work under treatment, accurate
n of the instrument with regard to a par-
rnace and operation is essential. Special
are used in many forced-air-circulation

Principle of Operation

wires of two dissimilar metals are joined
nd and connected to a sensitive millivolt-
the other, any difference in temperature
the two ends of the wires results in a small
otive force, which causes a deflection of
uring instrument. The magnitude of the
nerated depends on the difference in tem-
between the two ends of the wires, and
ators are usually calibrated to read tem-
direct. The two wires constitute the
ouple. The ends which are heated (the
tion) are joined by welding, while the
ends of the wires (the cold junction) are
outside the furnace.

Cold-junction Temperature

the current produced is proportional to
erature difference between the hot and cold junctions, any variation in the latter must be allowed for. Either the cold junction should be kept at a constant temperature, or a suitable compensating device used. A constant cold-junction temperature can be obtained by bringing the ends of the wire into a vacuum flask filled with ice, oil, etc., or to water-covered heads, or by burying them in an airtight container at least three feet in the earth. The zero of the instrument is then adjusted to correspond to the cold-junction temperature.

Compensating Leads

However, it is usually more convenient to locate the cold junction at the measuring instrument by employing "compensating leads" between the actual thermocouple wires and the instrument terminals, the leads being of metal of the same thermo-electric properties as the couple. The instrument is fitted with an automatic cold-junction compensator, consisting of a thermostatic spiral connected to the control spring of the millivoltmeter. The cold-junction reading needs to be checked at only fairly long intervals. The following points are important: the compensating leads must be connected to the correct terminals at the couple head and at the instrument, otherwise inaccurate readings are obtained; all leads from the thermocouple to the cold junction or instrument must run in conduits to reduce deterioration of the wires, and joints must be properly spliced, soldered and protected with tape. Since all thermocouple wires deteriorate with constant use, renewal, or at least a searching test, is necessary annually, particularly as small errors (less than 10 deg. C.) may cause irreparable damage during solution treatment; since the e.m.f. is extremely small, it is essential to keep all contacts clean, and the insulation sound.

Metals used for Wire

Metals used for thermocouples must not melt or become unduly weak at elevated temperatures, and must resist oxidation and corrosion. The e.m.f. developed should be high, uniform with temperature over the working area, and constant for a long period of time. Platinum and platinum alloys are used for the highest temperatures, but for the treatment of light-alloys, base-metal thermocouples (usually of Chromel-Alumel or Iron-Constantan) suffice. Wires of the base metals may be any dia. up to $\frac{1}{4}$ in., but thinner wires (about $\frac{1}{16}$ in. dia.) give greater sensitivity. Owing to the greater cost, platinum couple wires are generally about 0.02 in. dia. The wires are insulated from one another by refractory beads, fused silica quill, or some such similar substance, and the couple is generally protected by a sheath. For air furnaces up to 500 deg. C. bare wires are used to give maximum sensitivity, while special couples have been developed for molten salt baths. Platinum wires have, incidentally, the greatest scrap value.

Sheaths

Sheaths may be of a refractory material such as porcelain, fused silica or asbestos, or of metal such as calorized steel, nickel-chromium, pure nickel or stainless-steel. Platinum couples are usually protected by an inner refractory sheath, and an outer one of metal. The thinner the sheath the greater the sensitivity of the wire, although the protection afforded is less.

Sensitivity

The importance of sensitivity may be seen from an example which occurred in a factory where alclad sheet was found to be showing signs of cracking on reheat-treatment. The problem was referred to the suppliers of the sheet, whose technical staff considered that too-high temperature was causing the trouble. In order to reproduce working conditions, the nitrate bath at the factory was stabilized at annealing temperature and then raised to heat-treatment temperature from 380 to 490 deg. C.). The bath pyrometer, which was enclosed in a steel tube, was checked against an instrument with bare thermocouple wires; it was found that the latter registered a temperature rise much more quickly than did the pyrometer normally used. At one point the checking instrument registered 550 deg. C. It was apparent that, using the ordinary bath pyrometer, considerable fluctuation could take place in the temperature of the bath without it being charted on the recorder. The large-dia. metal sheaths of the pyrometer normally used were therefore replaced by thin asbestos sheaths, with a consequent improvement in the sensitivity of the instrument.

INSTRUMENTS

Instruments with a high electrical resistance are used, in order to reduce the effects of possible local increases in the resistance of the circuit due to faulty connections and other errors. Before being despatched from the makers pyrometers are calibrated for the resistance of the circuit, while a final adjustment after installation is made by means of a leads-balance coil. Subsequent alterations result in a loss of accuracy, a fact which must be remembered if instruments are changed.

E.M.F. Measurement

Two types of instrument are used for measuring the e.m.f. set up by the thermocouple: the millivoltmeter and the potentiometer. The
the more commonly used in industry but t
more accurate, since it automatically ba
potential from a standardized cell a
potential from the thermocouple. W
method of the millivoltmeter is that of di
tion, with the potentiometer no current
that the possibility of errors due to the
of thermocouples and leads is elimina
necessary periodic checking against a sta
may be done automatically or manually
intervals.

Indicators

Indicating instruments should have a
so that temperatures can easily be re
operatives, and be so mounted that the
eye-level; a mirror behind the pointer is
valuable in reducing reading errors. O
stallations temperature is indicated by a c
system.

Recorders

In recording instruments a chart is fitt
on a drum) below the pointer, and the
or electrically-driven mechanism dep
pointer at regular intervals on to an in
or thread interposed between the char
pointer. The same mechanism drives the
thus successive positions of the point
corded. Single-point potentiometers oft
an ink-pen, while each type of instrume
cord several thermocouples in succession
of an automatic change-over switch,
coloured ribbon, or a number of thread

Controllers

A somewhat similar mechanism is us
trollers, the pointer being depressed at
tervals to make or break contacts accor
position in relation to the desired temper
auxiliary current, obtained usually fro
transformer, is broken by such contacts
ates relays (through enclosed mercury s
increase or decrease the heat input to the

Breakages

All systems of automatic temperat
used in conjunction with thermocouples
their efficiency on the soundness of th
couples. Breakages are, however, som
evitable in spite of periodic examinati
this occurs, the controlling instrument w
zero, and cause the controller to func
would if the temperature were too low.
words, the mechanism will cause the heat
be increased to its maximum limit.
bilities of damage to both the plant an
being treated are sufficiently obvious.
such an occurrance a broken-couple ala
incorporated, arranged to give a special
breakage and, if necessary, to shut down
rate either to a safe level or to zero.

Controlled-recorders

tion instruments, to indicate, control and perature, are frequently used on forced ion furnaces. Controller-recorders are nounted near the furnaces in a pillar, also enclose most of the switchgear of Their doors must be readily accessible rts and ribbons may be removed without Also, since paper charts are subject to ıl change due to moisture in the atmos- ıirtight dustproof case is essential.

Correct Siting of Instruments

ı instruments are designed to withstand litions, they obviously should not be in- laces where they may be affected by dirt, ıes, shocks or vibrations. Shock-absor- ıtings (for example, of rubber) give pro- ıinst shock and vibration, an important ce an unsteady pointer makes correct mpossible and reduces the accuracy of lor should instruments be mounted where erature changes are likely to occur, near ›es for instance, or in draughts, or where bject to direct radiation of heat. In some ıs, the controllers and switchgear for a furnaces are located at a suitable central ı visible signals at the furnaces. When al points are used for a number of ther- individual return wires are preferred to ı return system, because of the greater cing faults.

Resistance Pyrometers

ce pyrometers are based on the principle lectrical resistance of a platinum wire with increase in temperature. A small oil (usually fixed at 1, 10 or 40 ohms, at is held in a protection sheath, and a small rrent passed through it. A high degree y is obtained. These instruments can be oth recording and controlling. They are, eldom used in light-alloy treatment plant, checking other instruments.

y-in-steel, and Pressure, Thermometers

meters of the ordinary type are unsuit- the mercury-in-steel and pressure types ed, although they are not often employed oy treatment. These latter thermometers entially of two parts. A bulb containing ınd connected by a metal capillary tube to n-type pressure-gauge, is placed in the Increase in the bulb temperature increases the pressure throughout the system, the difference being measured by the gauge (which is graduated by a temperature scale). By means of a lever system, the temperature may be recorded on a chart driven by a clockwork mechanism. The range of the mercury-in-steel thermometer is from about −40 to almost 600 deg. C.; but the upper range is increased between 350 and 800 deg. C. by making use of the vapour pressure of mercury. Temperatures are measured with an accuracy of 1 per cent. by each type of pressure instrument, provided that in volume the capillary is less than 1 per cent. of the volume of the bulb, and does not exceed about 100 ft. in length, nor experience temperature changes exceeding 50 deg. C. Owing to the effect of hydrostatic pressure, vapour-pressure-type instruments are calibrated individually, and once installed the relative heights of the bulb and the gauge must not be altered without recalibrating.

INSPECTION OF COUPLES AND INSTRUMENTS

The accuracy of couples and instruments must be checked regularly. Where extreme accuracy is necessary weekly checking is desirable, but more general practice is once each month. Wiring, especially connections, should be examined periodically for faulty insulation, dirt or corrosion. A standard themocouple, with a portable instrument, handled by experienced personnel, is required for the routine checking of production equipment. The hot junctions, protected by the same kind of sheath as that protecting the production pyrometer, must be placed together in the furnace or salt bath. In order to avoid small errors, when tests are made every precaution must be taken to reproduce the normal working conditions. To check a thermocouple completely a series of freezing-point determinations is necessary, the temperatures employed in the light-alloy range being the points of the following pure metals: tin, 232 deg. C.; lead, 327 deg. C.; zinc, 419.5 deg. C.; aluminium, 659 deg. C., and aluminium-copper eutectic, 548 deg. C. Boiling water (100 deg. C.) is also a useful point. Sometimes only one fixed point is checked, but although a couple may read correctly at one point it is not necessarily accurate over the whole range required.

Acknowledgment

The author is indebted to the Aluminium Development Association for the information on which this article is based.

SOCIATION OF BRONZE AND BRASS FOUNDERS that a meeting of members in the Midland be held at the Victoria Hotel, Wolverhampencing 11.45 a.m. Business matters of the ı will be discussed until luncheon at 1 p.m., sumption of the meeting at 2.30 p.m., Mr. vies will give some practical advice on the and operation of the system advocated ociation's publication "Costing a Casting." and brass founders in the area are invited presentatives to the session in the afternoon.

Assistant chief docks engineer of the Humber Ports, Mr. R. M. DYMOND, has died at the age of 52. An engineering graduate of London University, he started his career in the chief mechanical engineer's department at Cardiff Docks. In 1946 he was appointed assistant docks mechanical engineer for the eastern area of the South Wales docks. From 1950 to 1954 Mr. Dymond was assistant mechanical engineer, Humber ports. In 1952 he visited America and Canada as the representative of the Docks and Inland Waterways Executive to study coal and anthracite shipping appliances.

Equipment and Supplies

Bunker Vibrator

Efficient discharge from storage bunkers or hoppers containing powdered, granulated, or lump materials that tend to arch, pack or funnel is claimed to be ensured by the use of an internal bunker vibrator made by Sinex Engineering Company, Limited, North Feltham Trading Estate, Feltham, Middlesex. The device consists of a rotary electric vibrator attached to a steel reed which hangs down into the hopper (see Fig. 1). The complete assembly is suspended from a rolled-steel joist across the top of the hopper by means of anti-vibration mountings, which isolate the hopper structure from vibratory effects. When the equipment is in operation the vibration passes down the reed with increasing amplitude, reaching a maximum at the lower end of the reed, where the material contained in the hopper has a tendency to arch. As vibration loosens and releases the material, the pressure of the latter on the reed varies and causes it to bend and move about in the bunker; vibration is therefore always applied at the most needed point, and thus ensures complete discharge of the contents. Constructed of mild steel, the reed is made up to suit the depth of the hopper for which it is required. Its dimensions vary between 18 and 24 in. wide, ¼ to ½ in. thick, and up to 60 ft. in length. This apparatus would seem to be useful for moulding-sand hoppers where serious sticking is encountered.

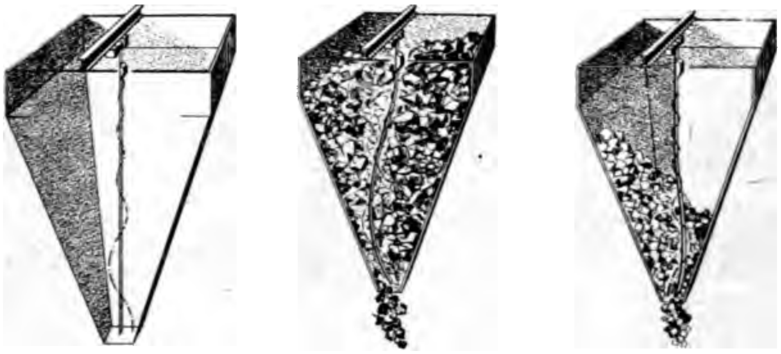

FIG. 1.—*Diagrammatic representation of the operation of the bunker vibrator made by Sinex Engineering Company, Limited, of Feltham, Middlesex.*

Portable Dewpoint Meter

A new dewpoint meter, developed in America and now being manufactured in this country under licence, is applicable in a wide range of processes where moisture contents of dry air and other gases must be determined. It is called the Alnor Dewpointer and is being marketed in this country by the Electric Resistance Furnace Company, Limited, a subsidiary of Efco, Limited, Netherby, Queens Road, Weybridge, Surrey. Typical uses of the meter include checking the dryness of air supplies for refrigeration, for air conditioning, and of atmospheres used in heat-treatment processes. It could possibly be a useful adjunct to cupola control. The meter is portable and self-contained, requires no coolant, and has a measuring range from −80 deg. F. to room temperature (or from 0.0015 to about 2.75 per cent. water vapour by volume). The measurements are made by compressing a sample of the gas to a pressure at which, on suddenly releasing the pressure a mist is formed, the temperature of the dew point then being calculated from the temperature and pressure ratio before expansion. Easy conversion of the sample temperature and pressure ratio to dew-point temperature is made with an Alnor dew-point calculator.

Electrolytic-conductivity Measuring Bridge

Electronic Switchgear (London), Limited, Works Road, Letchworth, Herts, have introduced a new portable electrolytic-conductivity measuring bridge (Mark 3). The new bridge has a finely divided silvered measuring-dial, which is indexed by a hairline "Perspex" cursor, enabling measurements to be made with great accuracy. A printed ivorine instruction panel is incorporated on the inside of the detachable hardwood cover of the case, and a shoulder strap has been provided for the use of operators who have occasion to carry out routine tests on measuring cells placed at strategic points throughout plant. The small dry battery, which energizes the transistorised circuits, is contained beneath a detachable cover within the accessory compartment—this modification permits the battery to be renewed without the inconvenience of removing the instrument panel. A baize-lined canvas cover is supplied to protect the hardwood carrying-case from damage.

Radiation-monitoring Film

Kodak, Limited, Kingsway, London, W.C.2, announce a new radiation-monitoring film. These films provide an efficient method of assessing the exposure of personel to X-rays and gamma rays. Two emulsion layers of different sensitivities are coated one on each side of the film, and the total density produced on both emulsions together is used as a measure of small quantities of radiation. If, as a result of large quantities of radiation, the density of the film is very high, the more sensitive emulsion can be stripped from the base, leaving the less-sensitive emulsion intact for measurement. Two overlapping ranges of measurement are thus provided. Each film is supplied in a separate light-tight packing, and is ready for immediate use. The films must be stored in a cool dry place, free from contamination by chemicals, fumes or radiation sources.

DEXION, LIMITED, Maygrove Road, Kilburn, London, N.W.6, report that an ingenious and cheap method of space saving was worked out by an ironmonger in Peru, who installed a suspended rack, made of slotted angle, from the ceiling. The idea would seem to have some merit for application in foundries, where floor space is at a premium.

MULTIPLE ACTING FLUX, LIMITED, 336, Watford Way, London, N.W.4, report that they are now handling various forms of artificial graphite, including billets, plates and rods, as well as powder, containing up to 99 per cent. carbon or more, through their works at 10, Collegiate Crescent, Sheffield 10; export orders are negotiated through their associate company Ex-Trans-Im, Limited, of the same address. In the same group is Colloidal Graphite, Limited, which has established at Bernard Lane, Sheffield 2, the production of colloidal graphite in water, mineral-oils and other carriers.

F Activities in South Africa

Report for the Session 1958/59

e annual general meeting of the South African :h of the Institute of British Foundrymen was in Johannesburg in May under the chairman- of the president, Mr. R. C. Cross. During ›usiness meeting the following officers were :d for the year 1959/60:—*as president*, Mr. L Coombs; *as senior vice-president*, Mr. D. on Jones; *as junior vice-president*, Mr. R. T. ıce; *as hon. treasurer*, Mr. S. Jane; *as hon. :ary*, Mr. J. Steele; and *as elected members of cil*, Mr. A. A. Guest, Mr. A. B. Anderson, B. G. Pidermann, and Mr. R. K. Tait. The ıl report was then presented from which it was : that activities of the branch included ex- ›n work in Natal, a meeting in Pretoria, the ıg of the first all-day conference, 15 general ions and the annual dinner at which there was ord attendance of 183 members and guests.

ring the year, 63 applications for membership been made—this was also a record number. ding the conference, ten papers had been pre- d with extremely good attendances on each ion; four works visits had been arranged and, 'o of these, attendance exceeded the 80 mark. bership changes recorded were 62 additions, ransfers from UK branches, four deletions, :esignations, two transfers to UK branches, three deaths. The membership total now at 371, a net increase of 56 for the year.

:erring next to the Natal section, it was ted that this was now well established under hairmanship of Mr. J. Robertson, with Mr. Richmond as hon. secretary. Three papers ›een presented since the inaugural meeting in ›er, 1958, and two works visits had been ged. There were now 42 members, whereas ›us to the first meeting there had been only 8.

t year, for the 21st anniversary banquet, the h had for the first time extended invitations : ladies, this gesture had proved so popular t had been followed up with two social even- nd attendance on each occasion had reached 0 mark.

Education Committee

education committee, formed during the besides preparing a memorandum on the :t of apprentice training to the Apprentice ng Board, had also suggested to the voca- guidance section of the Department of ır, that coloured slides depicting various s of foundrywork and patternmaking, would f assistance to attract apprentices to the ry. The suggestion had been welcomed and anch had prepared a selection of slides which shown in the Departments' pavilion at the Eastern Show. The success of the project d to slides being obtained from various other

More entries were received this year than last for the second Short Paper Competition for the Alexander Medal and Prize, and it was of interest to note that all the entries were from members who had joined the branch during the year. The report concluded by paying tribute to the branch president, Mr. Cross, for the amount of work he had done for the branch during his year of office.

Awards

The following branch awards were then announced: *The A. H. Guy Medal* to Mr. J. J. Marais in recognition of the many papers he had presented to the branch, and for services rendered to the industry to promote the use of synthetic sands for foundry work. *Member's Diploma* to Dr. H. J. van Eck for his paper presented to the 21st Anniversary Conference entitled "Review of the South African Foundry Industry." *Non-member's Diploma* to Mr. H. McC. Lawrence for a paper on "Billets and Bessemers" presented at a branch meeting. *The Alexander Medal* to Mr. S. M. Gray for his entry entitled: "How to Reduce Fettling Costs by Proper Wheel Testing," and the *Alexander Prize* to Mr. G. Skiffington for his paper dealing with "Manufacture and Properties of S.-g Iron." At the conclusion of the meeting, Mr. S. Pienaar proposed a hearty vote of thanks to the president, the hon. treasurer, and the hon. secretary, which was carried with acclamation.

Prize-winning Papers

After the annual general meeting, the two prize-winning papers in the Alexander Medal Short Paper Competition were read by the authors, extracts from which are given below.

How to reduce Fettling Costs by Proper Wheel Testing

By S. M. Gray

Mr. Gray stated that a properly-planned and executed grinding-wheel testing programme is the key to important cost reductions in foundry fettling operations. A good comparative testing programme would take into account all variables and eliminate them by tests. It would lead to true cost comparisons of the wheels tested, and to the best sources for purchasing.

In nearly all grinding operations, but particularly in fettling, he said, there was an ever-changing constellation of varying forces and factors which greatly influenced the outcome of a grinding-wheel test. If these forces and factors were present constantly and to about the same degree, or if they exerted their influence in the same direction, they would not be so exasperatingly troublesome to the testing engineer. But because they were ever-changing, in degree as well as direction, their effects

IBF Activities in South Africa

could not be predicted. Sometimes they might offset and neutralize each other, at other times they might be additive—either in a favourable way so as to enhance the performance of a given wheel—or in an unfavourable way which would detract from its true performance.

Major Variables

The major variables in swing-frame or floor-stand or portable fettling operations were the human element, the machine, and the material being ground. One variable introduced by the operator was the pressure exerted by him on the wheel-work interface; another was the tempo at which he worked. To keep the human element variable to a minimum, it was essential to use the same group of operators to the same degree on each of the samples involved in a test. The variables contributed by the machine were mainly impact stresses on the wheel face. These would be at a minimum in a machine relatively free of vibration, and in this case premature fracture of the exposed abrasive grains, as well as their dislodgement from their seats before they were completely spent, would be avoided. Conversely, a machine plagued with a lot of vibration would cause premature and wasteful fracture of the abrasive grains. Equally significant were the variables resulting from the material ground. The abrasiòn resistance of alloy steels varied greatly, and this affected the rate of dulling of the abrasive grains exposed in the wheel periphery. Aside from this physical aspect, certain metals have a pronounced effect on the rate of dulling of the abrasive grains due to chemical reaction at high temperatures. Titanium alloys were an example.

Requirements

To minimise the variables the following requirements must be met: (1) The same group of operators must be employed to the same extent on each of the sample lots involved in the test. (2) The same group of machines must be used. (3) The types of material ground in the test, as well as the dimensions of the work, must be the same or very similar. (4) The standard wheel with which the test wheels are to be compared must be included in the same test, and (5) the sample lots must consist of any equal number of wheels.

The author concluded his paper by stating that with the steady increase in labour, maintenance and overhead costs in recent years, the steel industry had found it necessary to increase the output per man-hour in their billet and slab grinding of alloy steels. It had elected to get this increase not by going to softer, faster, cutting wheels, as was done during world war II, but by utilizing higher grinding pressures. It had been clearly established that higher grinding pressures, together with harder grade wheels, gave more economical performance. Care must be taken, however, that this trend toward high grinding pressures did not cause attention to be focused entirely on the rate of cut, to the exclusion of other important factors,
such as the sacrifice in wheel life as measu
terms of units of metal removed per unit o
consumed; or the removal of a greater than
sary amount of metal to satisfactorily c
casting or remove defects from a billet.

Manufacture and Properties of S.-g

By G. Skiffington

Mr. G. Skiffington, in the course of his
gave details of the procedure adopted by hi
pany, the only mass-producer of s.-g. iron in
for the manufacture of this metal. All the r
he said, were made either on a jolt/squee
lift or jolt/squeeze turnover machine, depenc
the box size. The patterns were made ei
aluminium or brass, mounted on one-inct
cast-iron plate, and the metal melted in two
cupolas which were used on alternate days
cupolas were of the basic-lined type and c
mechanically by means of a skip hoist. A
charge would be as follows:—150 lb. pi
350 lb. s.-g. foundry returns; 300 lb. steel
180 lb. coke; 5 lb. ferro silicon; 40 lb. lim
16 lb. fluorspar; and 15 lb. calcium carbide.

When fluorspar was added to the charge
found to be a strong basic flux and slag li
It melted at a temperature of 1,330 deg. C
zone above the normal cupola melting zone.
amounts of fluorspar seemed to accelerate th
ing reactions by cleaning the coke and maki
slag more fluid before it reached the meltin

Mr. Skiffington went on to say that the co
operated the sealed ladle process and the equ
consisted of the following:

(1) A strongly constructed chamber in wh
process is to take place, constructed of st
prefabricated with steel plating and a stron
to minimize the danger of accidents occur

(2) A pneumatic ram to act as a plunge
sufficient pressure to force the magnesium
down through the metal in the sealed ladle.

(3) A plunger head which acted as a co
the sealed ladle when the plunger was
plunged position. This head also had a ¾-i
drilled and tapped hole, into which the mag
billet assembly was screwed.

(4) The magnesium billet assembly consis
a 4-lb magnesium billet encased in a mil
canister and a 3-ft. long carbon-dioxide-b
core. The magnesium billet was screwed
one end of this core, and the entire as
screwed into the plunger head ready for t
the metal.

(5) The sealed ladle was constructed o
plating with a thick refractory lining, which
be fettled after every melt. Two 725-lb. ca
sealed ladles were used in a bank and w
alternately, the metal was superheated in tw
kva direct-arc furnaces. After pouring into
sand moulds and being conveyed in cooling b
on a monorail conveyor, the runners and f
are knocked off and the castings clean
Wheelabrators.

The annealing cycle for s.g. iron casting

f heating to a temperature of 900 deg. C. for
termined time, then holding at that temper-
r a number of hours, and slowly cooling
deg. C. This temperature would be main-
or some time before slowly cooling to 400
The furnace was then opened, the bogie
wn, and the castings allowed to cool
y.

eeding requirements of s.g. iron were found
eater than that of normal grey iron but not
t as that of steel. Ordinary gravity feeders
e used successfully with this metal but
e not found practicable in a mass-produc-
ndry. Side feeders or atmospheric feeders
ainly used and mounted on the joint of
ulding machine plate with a small ingate
into the casting. A high percentage of
produced with this metal and it was there-
portant to include more slag traps than is
y found necessary in grey iron. The author
ed by stressing the importance of careful
eparation for the moulds used in the s.-g.
undry.

K. H. Coombs, the president-elect, proposed
y vote of thanks to both authors at the
ion of a lively discussion of each paper.

Sand as a Heat-exchanger?

eported that a novel way of heating air before
en into the furnaces is saving fuel in a number
garian foundries. And, says the newspaper
adság, if this method were extended to every
in the country it could mean an annual saving
,000 tons of coal. An essential feature of the
is the absorption of flue heat by sand, which
led from the top of the chimney to the air-
hamber below the furnace. The heated sand
rms up the air going into the furnace. The
taken through the chamber back to the top
himney in a continuous circuit. The technique,
by Dr. László Kun of the Thermo-Technique
h Institute, has been successfully tested at the
r Tractor factory and the Csepel Metalworks,
pest.

xport of Iron and Steel Scrap

request of the Ministry of Power, the Board
e announce that arrangements have been made
ng the continued export of specified types of
d steel scrap. An open general licence has
ued permitting during the period September 7,
mber 8 (inclusive), the export to any destination
and old metal consisting wholly or mainly
ht of iron or steel and having an f.o.b. value
eding £25 per ton in the following forms:—
pressed baled material and (*b*) scrap turnings
ngs.

ffect of this is to permit the free export of
grades of iron and steel scrap authorized by
rent open general licence (which expires on
er 6), to continue until December 8.

Publications Received

Properties of Cast Iron at Elevated Temperatures. Issued as ASTM Special Technical Publication No. 248, and published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa., USA; price $4.25, or 35s.

The Report covers a project started in 1954 on six commercial low-alloy grey irons and one unalloyed ferritic nodular iron, which were evaluated at 425 and 535 deg. C. by means of metallographic examination, tensile, creep-rupture, thermal-shock and growth tests. The specimens used were in the as-cast and annealed condition. The Report is preceded by a literature survey, and it is interesting to note that some of the classic work on the subject—being out-dated we suppose—is not considered worth referring to as a source of information. The conclusions drawn from the researches are excellent.

A sensible procedure was carried out on the original 12 samples submitted by industry, that is they were screened after some preliminary tests and the number was reduced to seven, which underwent extensive investigation. The research was carried out at the Southern Research Institute (which we believe is located in Alabama), and it is a matter of some academic interest that room temperature is deemed to be 80 deg. F.

From the results obtained it can be stated that, in general, the alloys are promising for long-time load-carrying applications, and for applications involving thermal shock at temperatures up to 425 deg. C., but not at 535 deg. C. The test results indicate, however, that the development of low-alloy cast-irons suitable for use at 535 deg. C. is quite conceivable. Variations in alloying have marked effects upon the properties of cast-iron at elevated temperatures. Molybdenum appears to be the most potent alloying element for improving creep-rupture properties, nickel for improving thermal-shock properties, and chromium for improving structural stability. The results of creep-rupture tests indicate that five representative test-alloys could be expected to sustain the following loads in tension for 10 years at 425 deg. C.:

	tons per sq. in.
Test No. 14 Cr/Mo-alloyed grey iron	13.4
„ „ 1 Mo-alloyed grey iron ...	11.0
„ „ 10 Cr/Ni/Mo/V-alloyed grey iron	11.0
„ „ 8 unalloyed ferritic nodular iron	7.6
„ „ 13 unalloyed grey iron ...	6.7

(The committee was under the chairmanship of Mr. J. S. Vanick.)

Exhibitions

Scottish Industries Exhibition

Kelvin Hall, Glasgow, will be the scene of the third Scottish Industries Exhibition from September 3 to 19. Over 200 exhibitors, representing 100 industries will display their goods. Those stands which will be of major interest to foundrymen will be briefly reviewed in next week's JOURNAL.

Machine Tool Exhibition

The Sixth European Machine Tool Exhibition will be held this year in Paris, from September 12 to 21. Displays which will be of interest to foundrymen will be briefly described in a future issue of the JOURNAL.

Latest Foundry Statistics

Iron Castings production

According to a statement issued by the Iron and Steel Board, production of iron castings in the second quarter of 1959 was 878,590 tons; in the second quarter of last year it was 887,210 tons. Production by district is shown in Table 1.

Following publication of this statement, the Joint Iron Council furnished a detailed commentary on the figures as below:—

General

The figures for the second quarter of 1959 give a clear indication that the ironfounding industry has progressed in its recovery from the serious recession which developed in the second half of 1958. Much, but by no means all, of this recovery has been based on the high level of activity in the automobile industry. Improved trade by other industries using iron castings, notably steel, engineering, and public works, has played a part.

Total output of iron castings in the second quarter of 1959 at 878,600 tons compares with 828,100 tons in the previous quarter of 1959—an increase of 6 per cent.—and with 887,200 tons in the second quarter of 1958—a reduction of 1 per cent.

Main Sections

For a comparison of the output of iron castings in the second quarter 1959 with output in the previous quarter and in the second quarter 1958 see Table 2.

TABLE 1.—*Production of Iron Castings, by District.*

District.	Iron castings (tons).	
	Second quarter.	Second quarter.
	1958.	1959.
Northern	89,050	70,920
North West	96,000	90,290
Yorkshire	98,830	92,970
East Midlands	174,300	184,350
West Midlands	188,550	204,630
Eastern and Southern Counties	93,480	98,650
Scotland and Northern Ireland	88,100	77,660
Wales and Monmouthshire	58,900	59,120
Total	887,210	878,590

The statistics relate to both grey and malleable-iron castings and output is classified according to the main industrial groups purchasing or using the castings.

Generally, owing to seasonal factors such as the incidence of holidays, the second quarter's output in any year is slightly lower than that of the first. This year, however, all sections of the industry, except that providing railway equipment, show an increase in their second quarter's production compared with that of the first quarter of 1959.

The automobile section established a new record with a second quarter production 13 per cent. higher than ever before recorded. The engineering section showed an increase of nearly 5 per cent. compared with the first quarter, but failed to reach the level of a year ago. Pressure pipes and fittings with a rise on the quarter of 10 per cent. virtually reached the production of the second quarter last year.

The production of building and domestic goods castings changed little compared with the previous quarter but maintained a rate of output noticeably ahead of corresponding periods in 1958. Ingot-mould production rose significantly in the quarter but, in line with the output of its customer industry—steel—was slightly below the second quarter of 1958.

Labour

The number employed in the ironfounding industry at the beginning of July 1959 was 123,000—virtually the same as three months previously but 6½ per cent. lower than a year ago.

TABLE 2.—*Output of Iron Castings, by Section.*

Section.	Second quarter, 1959 (thousand tons).	Percentage change in output.	
		Previous quarter.	Second quarter, 1958.
Automobile (including tractors) ..	175.0	+13.3	+21.4
Engineering (*a*)	287.0	+ 4.9	− 7.2
Building and domestic	135.6	+ 0.2	+11.1
Pressure pipes (*b*) and fittings ..	126.4	+10.4	− 0.5
Ingot moulds (*c*)	90.6	+ 7.9	− 1.8
Railway equipment	64.0	− 3.2	−30.8
Total	878.6	+ 6.1	− 1.0

(*a*) Including machine tool, textile machinery, electrical, shipbuilding, etc.

(*b*) Mainly gas and water.

(*c*) Mainly for the steel industry.

Distington's Continuous Casting

Establishment of a continuous casting division which will specialize in the design and manufacture of continuous casting plants for both ferrous and non-ferrous metals is announced by the Distington Engineering Company, Limited, a subsidiary of the United Steel Companies, Limited, Sheffield.

The division is currently engaged in design work for a wide slab machine which is to be installed at Ste. des Fonderies de Pont-à-Mousson in France, and which will be capable of producing continuously cast slabs up to 50 ins. wide and from 4 to 8 ins. thick. Distington Engineering is participating in this project and will design and build continuous casting plants on behalf of and under licence from Concast A.G., of Zurich, in which United Steel recently became a shareholder.

The personnel of Distington Engineering's continuous casting division has been closely associated with the experimental machines which have been developed and operated by United Steel since 1952.

McKee, Head, Wrightson, Limited

Two companies that have been associated for the past 15 years in contracting for the steel industry throughout the Commonwealth have formed a subsidiary company to serve the petroleum and chemical industries.

Head, Wrightson & Company, Limited, Thornaby-on-Tees (Yorks), and Arthur G. McKee & Company, Cleveland, Ohio, equally share the ownership of McKee Head Wrightson, Limited, a British company with headquarters in London, which will combine the experience of the two parent companies in the designing, engineering, and building of petroleum refineries and chemical plants throughout the world, exclusive of the North American Continent.

It is emphasized by the parent companies that each will continue its own individual activities as previously. Arthur G. McKee & Company and the 98-year-old British company are of similar financial positions, both having shown considerable progress during the last two decades.

/otes from the Branches

/orthampton and District Section

Morris Motors

bers of the Northampton and district section Institute of British Foundrymen made their first visit of the year in June when 33 members the works of Morris Motors, Limited (Tractor ansmissions Branch), Birmingham. Here the was shown round the tractor machining and y shops, where the Nuffield Universal tractor, r with the light three-cylinder version, was being ctured. The party was also conducted to the tices Training School. It was pointed out that x-apprentices of this works now held senior e positions in the British Motor Corporation.

Dartmouth Auto Castings

party then travelled to the New Inns Hotel dsworth, where they were received and enter- o luncheon by a number of executives of Dart- Auto Castings, Limited. Following luncheon, y moved out to the firm's No. 1 foundry. Here ices took over as guides, and about two hours ent going around the plant. This was most ng to all concerned and was considered to be foundry so far visited as far as high produc- s concerned. The foundry was producing close) tons per week of flywheels, brake drums, mani- earboxes and similar castings, with a labour 420.

ng and Knockout

oundry was split up into five production units, nsisting of moulding machines, mould conveyor ock-out, the whole of the sand for four of the units being obtained from one central sand-plant, which produced 240 tons of sand per hour from eight mixers running continuously from the start to the finish of the shift. The fifth unit had its own sand plant of 90-tons-per-hour capacity, and incorporated a station master where 140 moulds were made per hour in boxes approximately 36 in. by 30 in. by 10 in. by 10 in. One of the moulding units incorporated two pairs of shockless-jolt automatic machines. The other three units were equipped with manually-operated pin-lift machines, which were also producing 120 moulds per hr. per pair of machines, although in a considerably smaller box approximately 20 in. by 18 in. by 6 in. by 6 in. Knock-outs on these moulding units were all of the self-discharging type, feeding the castings and sprue into pendulum conveyor buckets.

Shotblasting and Fettling

From the knock-out station the pendulum conveyor took the castings round a cooling tower before returning them for shot-blasting. The fettling shop was a very simple but effective layout of roller track, upon which was used a number of small steel bins. The castings were fed out of the shotblast machine into the bins and down a series of lengths of roller track, with inter-connecting switches to pedestal grinders and other operations normally found in such a shop.

General

The general impression given by this foundry was one of extreme efficiency. It was stated that most of the operatives worked on piecework, and that much attention was paid to time and motion study. The percentage of scrap castings was phenomenally low at 1½ per cent., and the visitors were interested to see that a small amount of shell coremaking was going on, apparently on an experimental scale. The CO_2 Process was also being used for a lot of the cores, quite apart from the use of the orthodox oil-sand practice, but it

photographs taken Annual Dinner of BF East Midlands h in the Midland , Derby at the end t Session.

Left (from left to right): Mrs. Gardom and Mr. J. W. Gardom, retiring branch president; Mrs. Peace and Mr. A. E. Peace, the retiring IBF national president, with Mr. G. C. B. Lamb, the branch secretary. Above: Mr. P. A. Russell; Mr. H. J. V. Williams; Mr. M. M. Hallett, and Mr. B. N. S. Perry.

Notes from the Branches

should be appreciated that the majority of the work was not cored. Three of the four 12-tons-per-hr. hot-blast cupolas were in blast at the time of the visit, and all the metal was collected in receivers prior to pouring in ladles. After walking round the foundry, members of the section were entertained to tea in the works canteen, when a further opportunity was offered for the exchange of information with the same executives they had met at luncheon. Simultaneously, Mr. W. Brindley, the managing director, welcomed the visitors and spent some time himself replying to questions. Mr. R. Jelley, senior vice-president of the section, proposed a vote of thanks and said how much both he and the section had enjoyed the visit.

Personal

Mr. R. A. G. DUFF has been appointed a director of F. H. Lloyd & Company, Limited. Mr. H. P. R. SCOTT has resigned.

Mr. G. R. B. FIELDEN, engineering director, Ruston and Hornsby, Limited, Lincoln, has been appointed managing director of Hawker Siddeley Brush Turbines, Limited.

Mr. A. K. SEN has been appointed managing director and Mr. P. C. KAVANAGH, assistant managing director, of Indian Oxygen & Acetylene Company, Limited, a British Oxygen Company subsidiary.

Mr. MARK RUSSELL, secretary of S. Russell & Sons, Limited, of Leicester, has been appointed a director. Mr. KENNETH HOUGHTON, manager of the constructional department, has been appointed a departmental director.

Mr. J. HILES, head of the science department of Sheffield College of Technology, and acting principal since last February, has been appointed principal of the College in succession to the late Dr. G. LAWTON.

Mr. H. P. MILLAR, who recently joined the Federated Foundries' group, has taken up the assignment at Thomas Allan & Sons, Limited, Bonlea Foundry Thornaby-on-Tees, Yorks, and has also moved his residence to that area.

Mr. and Mrs. ERNEST PENNETT celebrated their diamond wedding anniversary on August 16. Mr. Pennett, who is 88, retired from work as a storekeeper with Hepworth & Grandage, Limited., engineers, Bradford, when he was 83.

Sir GEORGE GARDNER, director of the Royal Aircraft Establishment, Farnborough, since November, 1955, has been appointed Controller of Aircraft at the Ministry of Supply. He succeeds Air Chief Marshal Sir CLAUDE PELLY, who has been appointed Member (Designate) for Weapons of the Atomic Energy Authority.

Air Commodore, N. A. TAIT, O.B.E., M.I.MECH.E., has joined the sales staff of Simmonds Aerocessories, Limited, a member of the Firth Cleveland group, and will be based at the group's headquarters at Stornoway House, St. James's, London, S.W.1. Air Commodore Tait was, until his retirement, Director of Aircraft Engineering at the Air Ministry.

Borax & Chemicals, Limited, announce that Mr. W. J. HATCHLEY, who has been managing director of the company since its inception, will relinquish executive duties on August 31, but remain a member of the *board. Mr. G. L. THOMPSON,* also connected with the company for many years, will be appointed managi director with effect from September 1.

United Dominions Trust, Limited, announce th Mr. G. CUTTS has been appointed manager of th Sheffield branch in place of Mr. R. A. NEAL, who ha been posted overseas to join the board of the Bank of Trinidad (Gordon Grant), Limited, a newly-formed company in Trinidad in which UDT has a controlling interest. Mr. D. H. CATER will replace Mr. Cutts at UDT's Derby office.

Mr. L. W. BUCKLER, has been appointed general manager of the Rolls-Royce, Limited, Derby group of factories and a director of the company's aero division. Mr. Buckler, who has been general manager in charge of manufacturing, worked during the war on the installation of Merlin engines in tanks and on early development of the jet aero engine. He joined Rolls-Royce as an apprentice in 1922.

Ernest Scragg & Sons, Limited, textile-machinery manufacturers, Macclesfield, announce that Mr. F. SCRAGG, former managing director of Sydney and Scragg, Limited, who has been in charge of te developments since his firm became members of Scragg group in 1957, has been appointed a dire as have also Mr. TIMOTHY DUFORT, comm manager of the group, and Mr. H. HANCOCK, sales manager.

Electric Resistance Furnace Company, Lim announce that Mr. H. J. TUCKER, southern-area manager for the past 10 years, has been appoi service manager. Mr. Tucker, who joined the org zation in 1935, will continue to operate from company's head office in Queens Road, Weyb Surrey. Two other appointments notified are of Mr. C. A. MCNEILL, formerly technical sales ager of another furnace manufacturing company, has joined the technical sales staff at the Midla area office in Birmingham, and Mr. M. J. PARSONS who has joined the sales organisation at the head office in Weybridge. Mr. Parsons has worked for many years with Edwards High Vacuum, Limited, and will specialize in vacuum heat-treatment processes and equipment.

Holman Brothers, Limited, Camborne, Cornwall, announce the appointment of Mr. JAMES L. RITCHIE as sales director, with responsibility for the direction of the Holman Group's sales organization at the Camborne headquarters and in the United Kingdom and overseas. He has become an associate director of Holman Brothers and is based at Camborne. Mr. J. F. HOLMAN, who recently became joint managing director of the company, had hitherto been responsible for group sales direction covering the products of the parent company as well as those of the subsidiary companies, Climax Rock Drill and Engineering, Limited, Dustuctor Company, Limited, Maxman Power, Limited, and Goodyear Pumps, Limited. Mr. Ritchie was previously with Consolidated Pneumatic Tool Company, Limited, as assistant to the managing director, and before that a director of the main board of Aveling Barford and of Goodwin Barsby, Limited, and Barford (Agric.), Limited.

Increases of Capital

HAWTHORN BAKER, LIMITED, engineers, etc., of Dunstable (Beds), increased by £88,000, in £1 ordinary shares, beyond the registered capital of £14,500.

R. W. HILL & COMPANY, LIMITED, civil and general engineers, etc., of Chelmsford (Essex), increased by £22,500, in £1 ordinary shares, beyond the registered capital of £2,500.

ATLAS COPCO (GREAT BRITAIN), LIMITED, engineers, diesel engine manufacturers, etc., of Wembley (Middx), increased by £100,000, in £1 shares, beyond the registered capital of £100,000.

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News in Brief

The Engineers' Guild is removing from 78 Buckingham Gate, London, S.W.1, to 201 High Holborn, London, W.C.1, at the end of September.

English Steel Corporation, Limited, Sheffield, have ordered an 80-ton electric furnace for casting in vacuum. The equipment will be able to deal with ingots of up to 150 tons in weight.

Owing to the recent dispute in the printing industry, the industrial safety division of the Royal Society for the Prevention of Accidents has had to postpone the national safety campaign until the week beginning November 23.

Davy-British Oxygen, Limited, a joint subsidiary of Davy-United, Limited, Sheffield, and British Oxygen, Limited, which was formed to provide new oxy-steelmaking processes, has moved its headquarters to Sheffield from Harlow New Town.

Lord Dudley Gordon, chairman of Hadfields, Limited, Sheffield, presented clocks to 49 employees on August 13 to mark the completion of 25 years' service. Also they were enrolled as members of the firm's "25 Association," which now has a membership of 1,430.

Sheffield Corporation Transport Department, has followed up a repeat order for 14 of Leyland Motors' new Leopard single-deck buses, with another order for 18 rear-engined Atlantean double-deck buses. Earlier orders from Sheffield were for six Leopards, now in operation, and for 25 Atlanteans.

Although the Birmingham brass firm of Alfred Case & Company has been taken over by the Delta Metal group it will continue to be directed by four members of the West family. The brass strip output of the company now runs at about 4,000 tons annually but it is planned to double that output within the next few years.

A completely automatic 1,500-gall-per-hr. dairy bottling line for the Waikato Milk Company, Limited, Hamilton, New Zealand, has been assembled for trial running at the works of Dawson Bros., Limited, bottlers' engineers, Gomersal, near Leeds, who secured the contract, worth over £26,000, in face of keen home and overseas competition.

Simmonds Aerocessories, Limited, Treforest, Glamorgan, members of the Firth Cleveland group, have entered into licensing agreement with Pryor Manufacturing Company of Mansfield, Ohio, USA, to manufacture hydrant fuel-dispensers and general civil and military aircraft refuelling vehicles for world-wide territories, except the American continents.

Two new subsidiaries have been formed by the Birmingham Small Arms Company, Limited, to take over the small tool and broach manufacturing activities of B.S.A. Tools, Limited. They are B.S.A. Small Tools, Limited, and the B.S.A. Broach Company, Limited. Management of all three companies will be carried on by the same executive and personnel as hitherto.

To meet an increased demand for electricity meters in Scotland, Ferranti, Limited, Hollinwood (Lancs), has commenced production at its Dundee factory. This new arrangement will speed delivery of meters and provide increased service facilities. In 1957 the company started to manufacture distribution transformers in Inverness in order to satisfy the requirements of the Scottish market.

A new works has just been completed at a cost of over £20,000 by Thomas Hill (Rotherham), Limited, mechanical and electrical traction engineers, of Rotherham (Yorks). The company manufactures the diesel hydraulic locomotives of Sentinel (Shrewsbury), Limited, a Rolls-Royce, Limited, subsidiary, as well as carrying out repair and conversion work to many types of industrial locomotives.

Last year when the National Society of Master Patternmakers visited Germany, they were interested in a small bench router made by Friedrich Zimmermann of Esslingen. Mr. J. J. Harvey bought one of these machines. He is so satisfied with it that as from January 1, next year, his firm, J. J. Harvey & Pressurecast, Limited, Lime Bank Street, Manchester, 12, is taking over the United Kingdom selling rights.

Fire wrecked several machine-shops at the Bo'ness Iron Company's works early on August 21. As firemen fought the flames, officials tried to probe the facts, for a small fire was discovered in the patternshop at teatime on the previous night—but was put out within half an hour. The patternshop roof collapsed in the second outbreak, and electric motors, wooden patterns, and other equipment were wrecked.

A one-week course for sixth-form grammar-school boys, the first to be held at the Thornbury Works, Bradford, of English Electric Company, Limited, ended last Friday. During the week, the ten boys who had taken the course, toured the various departments at the works and attended talks on careers, promotion prospects, and the type of work available in engineering. The boys all agreed that it had been well worth while.

To facilitate co-operation between the company and the aircraft industry, the British Oxygen Company, Limited, is forming a new organization, British Oxygen aviation services. A number of the company's subsidiaries will be involved in the new venture. The company announces that a new works at St. Helens (Lancs) will start supplying oxygen and other industrial gases to the Lancashire area in about December of this year.

The only two bids for two of a number of contracts to supply generators and turbines for the Tennessee Valley Authority's Wheeler Dam project have been submitted by the English Electric Company, Limited. One of the bids, the authority states, was of $3,415,334 (about £1,219,300) and the other $5,025,315 (about £1,794,000). English Electric was underbid by an American company on two other contracts, and by an Austrian company on two more. The TVA board has 60 days in which to consider the bids.

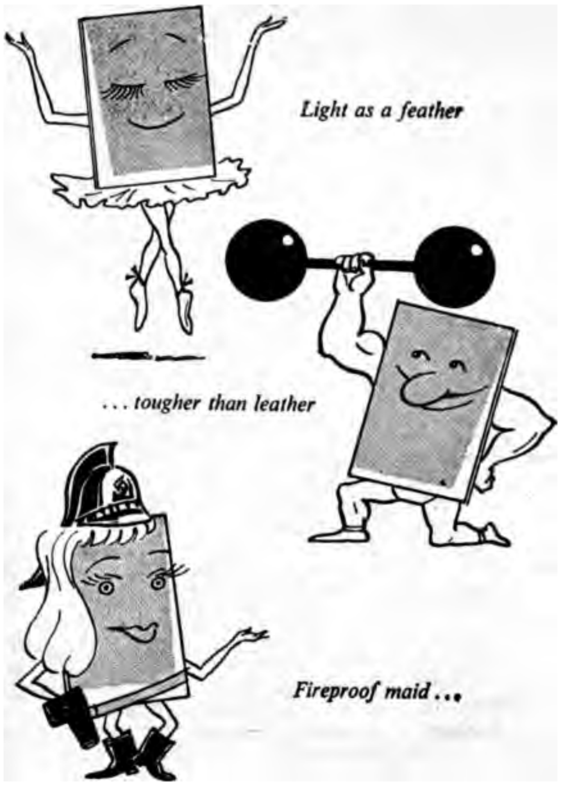
It is reported that unemployment figures in West Bromwich are falling, and there is a general feeling of optimism in the foundry trade. Last week, Mr. J. K. Ferguson manager of the West Bromwich Exchange said that the improvement shown in the employment figures during the past six months is being maintained, and an official of one of the foundry associations has also said: "The trend of trade in the foundry industry has been one of improvement in the recent months. This has resulted in a higher figure of employment."

Mr. W. A. Gibson Martin of the British Iron and Steel Federation gave a talk on "Steel in the National Economy" to Walsall Rotarians at their meeting last week. He surprised his audience with statistics relating to production and price range. Saying that one large British plant had produced 10,000,000 tons of steel, he added that the cheapest kind of steel was the ship's plate which was worth about £43 a ton. High-grade tool-steel ranged up to as much as £40,000 a ton. The

(continued on p. 92)

Recent Wills

., a director of Dorman, Long & Com- mited, Middlesbrough	£29,441
H. G., a special director of Vickers- ts (Shipbuilders), Limited	£8,975
H., founder of the Constructional ng Company, Limited, Birmingham ...	£50,558
NT, honorary president of G. & J. Weir, engineers and ironfounders, etc., of	£3,304,393
as, chairman and founder of Thomas Sons (Widnes), Limited, engineers, iron- etc.	£17,152
J. B., chairman and managing director Bros. (Manchester), Limited, machine- rs, etc.	£117,186
IR JOHN GIBB, an original director and puty chairman of Imperial Chemical , Limited	£46,588
I., founder and managing director of ros. (Wolverhampton), Limited, metal and non-ferrous founders	£18.628
I., formerly chairman of James Cartland imited, brassfounders, of Birmingham, aging director of Mechanical Products, ...	£89,880
, NORRIS, late director and secretary of Engineers), Limited, Bradford, and a f J. Parkinson & Son (Shipley), Limited, ool makers, etc., and Carter Gears, Bradford	£10,100
WILLIAM, chairman and managing f Barrow Ironworks, Limited, a director rrow Hæmatite Steel Company, Limited, uarries, Limited, and Ullcoats Mining Limited	£45,858
J. B., former chairman and managing of Mavor & Coulson, Limited, mining manufacturers, etc., of Glasgow, and hairman of the North British Loco- ompany, Limited	£41,432
JOHN, late chairman of W. T. Henley's Works Company, Limited, former of the Cable Makers' Association, Fuel and Power Controller for London h-East England, 1939-45	£40,172
, joint managing director of Noble & mited, machine-tool makers, of Felling- Gateshead, former chairman of the New- tion of the Institution of Production and a member of the North East Coast n of Engineers and Shipbuilders ...	£90,506
JACKSON, founder and sole partner of Millar & Company, combustion engineers neers' agents, of Glasgow, chairman of otors, Limited, and a former chairman Fairfield Engineering & Shipbuilding Limited, and a director of other com-	£23,279
WILLIAM J., eminent metallurgist, director ritish Iron and Steel Federation, 1922-46, dent of the Iron and Steel Institute and Medallist (1947), former president of the tandards Institution, Institute of Weld- nstitute of Fuel, and the Junior Institu- ngineers	£24,922
., deputy chairman of Thos. W. Ward, Sheffield, and chairman and managing of the Ketton Portland Cement Company, Thomas Smith & Sons (Rodley), Limited, ith (Keighley), Limited, Widnes Foundry ering Company, Limited, and the Shap Company, Limited	£60,438
shipyard manager for John I. Thorny- Company, Limited, London, S.W.1 ...	£5,710
B., late chairman of Gimson & Company r), Limited, engineers and ironfounders, ...	£112,841
NK, works director of Bulpitt & Sons, manufacturers of cooking and heating s, etc., of Birmingham	£68,291
R. H., son of the late William Laird, artner of Laird Bros., which became Laird & Company, Limited	£51,629
M. G., for 40 years civil engineer with am Arrol & Company, Limited, bridge crane makers, etc., of Glasgow	£11,722
. S., late director of Samuel Osborn & , Limited, steelmakers, of Sheffield, and Aluminium Company, Limited, Wolver-	£211,021
W. S., formerly chairman and managing of P. & W. MacLellan, Limited, , iron and steel merchants, etc., of	£56,132



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Phenomenal trays, these core trays,
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Of never seen before trays.

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Tres bon trays, these core trays.
Smooth to lie on, hard as iron,
Last for ever more trays.

And now to the men in the foundry stores,
As the rooks would say, for the good of the cores,
Beware of trays that are nearly right,
Insist on trays of HOOKERLITE.

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most expensive of all was that used in the manufacture of watch springs, this being £500,000 a ton.

MARCO CONVEYOR & ENGINEERING COMPANY, LIMITED, of London, in conjunction with the Constructional Engineering Company, Limited, of Birmingham, have obtained an order from Jugoslavia for the supply of a complete mechanized foundry for the production of tractor engines. The order has been obtained in the face of competition both from home and abroad. The whole of the equipment will be designed in Great Britain, but some portions of the steelwork will be fabricated in Yugoslavia. The value of the equipment to be manufactured in this country is £73,000.

F. H. LLOYD & COMPANY, LIMITED, Wednesbury (with their associate companies at Burton and Derby) are staging their annual horticultural show, sports and gala day on Saturday, September 5. In the show, competition entries are open to employees, wives, sons and daughters (or, in some cases, works departments) in well over 100 classes of produce and handicrafts (there is even a competition for cage birds). The stated objective is: "health and friendship in horticulture for each employee and family"—one which the long schedule of events reveals is taken up very enthusiastically by the whole staff.

THE DEPARTMENT OF COMMERCE AND MANAGEMENT of Sheffield College of Technology has organized a special course, starting in November, for young managers and potential managers. Students must be already engaged in industry and sponsored individually by their employers, and full-time attendance at the College for about 15 weeks in each of two years is required. The first year deals with the essential qualities of management required by young executives, and the second with a study of the means of exercising effective control in all fields of business activity, and industrial relations and personnel management.

THE 1,400 EMPLOYEES at the Holwell Works of the Stanton Iron Works Company, Limited, have been notified that some of them may shortly become redundant. In all 150 men might be affected. In a statement to the Press the company regretted the move which it attributes to the continued low demand for high-phosphorus foundry pig-iron which makes it necessary to blow out the No. 4 blast furnace at Holwell Works. This will mean that only one furnace is in operation making other grades of foundry pig-iron. The statement goes on, "The decision will give rise to some redundancy which will be the subject of negotiation between the company and the trade unions concerned. The men involved will be given as long a notice as possible, terminating on October 2." No notices have yet been issued.

BIRMINGHAM AND DISTRICT COMMITTEE of the Confederation of Shipbuilding and Engineering Unions is organizing in September, a ballot among the 75,000 engineering workers in the motor-car industry in Birmingham, who will vote on a proposal that the 1961 holiday should be taken in the first two weeks of July instead of the traditional last week of July and first week of August. It will be recalled that the Coventry and district committee of the Confederation has already held a ballot on a similar proposal and some 80,000 workers in the motor-car industry voted for a change to new holiday dates at the beginning of July. It is thought that owing to the interrelation
of Birmingham and Coventry industry conn
the motor industry, there is a strong case in
firms in both centres closing simultaneousl
annual shut down.

A MEETING of the German Hardness Testi
is to be held in Dortmund this year from
23 to 25. An invitation has been extended
bers of the Hardness Testing Group of th
of Sheet Metal Engineering to attend thi
and to submit one or more technical con
The chairman of the ISME Group, Mr. J.
hopes it may be possible to accept this invi
will be happy to hear from any member,
else interested in attending the meeting or
paper. The general theme of the n
"Measurement of Hardness in Theory and
Anyone interested in further details of th
is invited to communicate with the hon. se
the ISME Hardness Testing Group, Mr. A.
Gillette Razors and Blades, Great West
worth, Middlesex.

Obituary

The death is announced of Mr. FRANK
who until his retirement in 1942 was managi
of Isaac Butterworth, Limited, of Rochdale
87 years of age.

Mr. H. J. ROWE, for many years a
Constructional Engineering Company, Lir
mingham, died on Tuesday, aged 69. Brc
of the late Mr. D. Howard Wood, he
director of very long standing of Adaptat
ing Machine Company, Limited, and of
Sons, Limited. Until recently, he was ac
Institute of British Foundrymen and wa
president of the Birmingham branch.

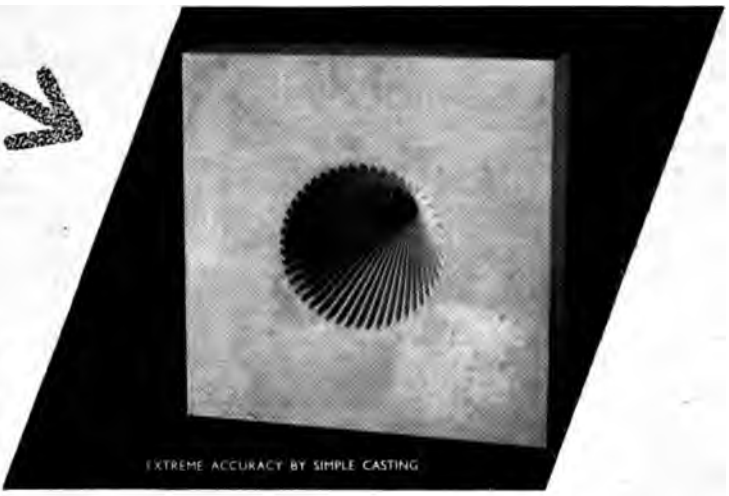
Mr. STUART NETHERWOOD BARKER, ch
Bardic, Limited, Northam, manufacturers of
die-castings, died on August 9. Originally
worked with his father, Mr. Joe Barker, at
Engine Company, Woolston. He was ther
job with the British Power Boats where
technical assistant, and was subsequer
manager and then managing director. He
in 1944 and later formed Bardic, Limited.

IPE Medal Awards, 1957/

The Council of the Institution of
Engineers announced the following medal
the year, 1957/58:

Members' Medal and also the *Hutchinso*
Award to Mr. A. J. Lawrance, works direct
Allen, Limited, for his paper, "Applicatio
Erosion Machining". *Non-Members' Me*
J. E. Littlechild, officer in charge of tec
on chemical plants for the UK Ato
Authority, Springfields Works, Salwick, Pre
paper, "Production Problems associated wi
Atomic Energy." *The J. D. Scaife Meda*
Professor N. A. Dudley, head of the De
Engineering Production, University of
and Mr. W. J. Kease (non-member), compu
AEI-Hotpoint, Limited, for their respec
"Output Pattern in Repetitive Tasks,
Reference to Compensating Relaxation
and "Computer-assisted Production Cont

The Awards will be presented at the an
of the Institution which is to be held at the
Hotel, London, W.1, on November 19.



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Raw Material Markets

Iron and Steel

With the return to work of the major portion of the foundry industry on completion of the annual holiday, production of castings will be stepped up considerably and deliveries will be resumed in accordance with consumers' requirements. The biggest demand, comparatively, continues to emanate from the motor vehicle trade for high-duty castings, and the engineering and speciality foundries catering for them have good order-books, which will enable them to continue at least at recent levels of production for some time ahead. High-quality castings for many other trades also comprise, in the aggregate, an appreciable tonnage, which enables the foundries producing them to obtain reasonably good outputs, although overall productive capacity in many instances is capable of undertaking more work, notably for the machine-tool industry, collieries, railways, and the heavy engineering trades. There is plenty of pig-iron available for the use of these foundries, as after present demands are satisfied producers of low-phosphorus irons, hematite, and refined irons have tonnages to spare from current production and many of them have fairly appreciable stocks on hand which they are anxious to reduce.

So far as the light-casting trade is concerned, the improved trading position for many foundries producing these castings is maintained, and this has in turn brought additional demands for high-phosphorus iron, but not in the same ratio, due to the larger usage of scrap. Makers of high-phosphorus iron continue to work below capacity, but these reduced tonnages are more than sufficient to satisfy current requirements and outputs and stocks remain much in excess of present usage. The export market is relieving producers of some tonnage of all grades of pig-iron, but more could be supplied if orders could be obtained against the strong competition from makers abroad.

Business at the re-rollers continues to improve, good demands being forthcoming for small bars and light sections. The present call for these has enabled many of the re-rollers to increase the number of working shifts, and for reinforcing and wire rods there is a strong demand.

Home steelworks are keeping the re-rollers fairly well supplied with steel semis, outputs of which have been reduced recently on account of holiday influences. Present demands are sufficient to cover the steelworks' outputs in many instances for three or four weeks ahead.

Some orders for bars, sections, etc., are being booked by the re-rollers for the export market, but these consist mainly of special quality steels, as for ordinary mild steels overseas prices continue below UK figures, although the prices of continental steel are rising.

Non-ferrous Metals

The labour strike which began at Kennecott Copper Corporation's four western US plants on August 10 spread last week to most other major US copper producers, thereby ensuring that at least 75 per cent. of the nation's capacity will be idle. The actual strike, so long expected, went off like a damp squib in the London market. Realization that US fabricators were loaded with about two to four months' supplies and that foreign metal would be freely available was food enough for pause. Indeed, buyers more than paused, preferring to stay out of the market
the present situation is a little clearer. Conseq
the London price did nothing spectacular.

One of the strongest influences was the rumo
the US steel strike was nearly over and that t
between labour and management would soon be
But it was no more than a rumour and the
situation in the US steel industry is still obvi
long way from being resolved. The mark
copper on both sides of the Atlantic are dull
concerned are awaiting developments. Mea
there have been no changes in the US price st
with both custom smelters and producers
30 cents a pound.

News calculated to shock comes from Rh
where it is reported that the European Mine
Union—4,500 strong—has proposed the natio
tion of the Copperbelt mines. This is reported
tained in a lengthy memorandum and it is und
that approaches may be made to the 26-man
mission of inquiry which is examining the Rh
Federation before its constitution is revised nea
The idea behind the proposal to nationalize
the unions believe that if the mines were natio
it would go a long way towards solving the
of African advancement because the Gove
could more easily lay down job classification
able to both black and white.

Tin continues to experience remarkably
trading conditions. Demand is good in th
where the price has edged up to near its pea
for the year. This activity was helped by th
pletion of the Malayan elections and the staten
the Prime Minister, Tunku Abdul Rahma
foreign capital would be encouraged and that
resources are scheduled for further devel
Demand in New York tends to be patchy, b
better than it has been of late as more an
observers of the industrial scene are convinc
the US steel strike will soon come to an e
London steady trading conditions prevail an
useful buying from the Continent it is felt t
price would be several points higher if it w
for the buffer stock manager disposing of his
stock.

Lead continues quiet on both sides of the
The market in London is satisfactory and the
tion has been steadily advancing. In the
production capacity of both lead and zinc is
by the copper strike. But this will only assu
portant proportions if the copper strike spre
include American Smelting & Refining Co
The position is not clear—a situation reflec
quiet trading conditions. The US price is un
at 12 cents a pound.

Zinc continues to be a good market and
that the US steel strike would soon be over
a bright glossy look. The price in such circum
held firm, and demand has been satisfact
both London and New York, taking into acco
not much inquiry is coming in from the gal
trade. Canada has raised the price ½ cent.

As a postscript to lead and zinc it was ann
from Washington at the beginning of this we
the US Senate had formally ordered the tari
mission to make new fact-finding studies of le
zinc, giving particular attention to the US imp
of lead and zinc products. The tariff commi
asked to submit "specific findings" as to
condition in the lead and zinc industries and
what additional import restrictions, if any,
required, "so that mining operations in the US
conducted on a sound and stable basis."

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Current Prices of Iron, Steel, and Non-ferrous M

(Delivered unless otherwise stated)

August 26, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 6-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 6-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 11s. 6d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 6-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons. £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 pe
£39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Sh
(N.-E. Coast), £42 2s. 0d.; boiler plates (N.-
£44 12s. 0d.; floor plates (N.-E. Coast), £43
angles (N.-E. Coast), £39 16s. 6d.; joists (N.-
£39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, u
and flats 5 in. wide and under, untested soft basi
and over, £39 1s. 0d.; under 10 tons to 4 tons, £4
under 4 tons to 2 tons, £41 3s. 0d.; hoop and st
100 tons and over, £38 0s. 0d.; uncoated strip mill
rolled, under 3mm. to 12g., 25 tons to under
£43 16s. 0d.; black sheets (hand mill), 24g., 10 tons
£57 14s. 6d.; galvanized corrugated sheets, 24g., 1
over, £66 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £6
nickel-chrome, £99 4s. 0d.; nickel-chrome-mol
£111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £228 0s. 0d. to £228 5s.
months, £227 0s. 0d. to £227 10s. 0d.; s
£228 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3¼
rods, 249s. 6d. per cwt. basis; 20 s.w.g., 284s. 6

Tin.—Cash, £792 0s. 0d. to £793 0s. 0d.; thre
£792 0s. 0d. to £792 10s. 0d.; settlement, £793 0s

Lead (Refined Pig).—Second half August, £7
to £71 17s. 6d.; second half November, £73
£73 7s. 6d.

Zinc.—Second half August, £84 17s. 6d. to £
second half November, £83 12s. 6d. to £83 15s. 0d

Zinc Sheets, etc.—Sheets, 15g. and thicker,
destinations, £120 10s. 0d.; rolled zinc (boiler
English destinations, £118 5s. 0d.; zinc oxide (
d/d buyers' premises, £99 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10
sheets to 10 w.g., 202s. 0d. per cwt.; wire, 2s. 8
metal, 202s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £152; B6, £195.

Brass (High Tensile).—BS1400, HTB1, £180
£200; HTB3, £212.

Gunmetal.—BS1400, LG2, £188; LG3, £199;
£249; G1, 1%, £236.

Phosphor Bronze.—BS1400, PB1 (AID releas
BS1400: 90/10/1, £266.

Leaded Phosphor Bronze.—BS1400, LPB1, £21

Phosphor Bronze Strip, etc.—Strip, 290s. 9d.
wire, 4s. 1⅛d. per lb.; rods, 3s. 4d.; tubes, 3s.
cast bars: solids 3s. 3¾d.; cored 3s. 4¾d. (Charles
Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 i
0.056, 3s. 10¼d. per lb.; round wire, 10g. in coil
cent.), 4s. 3¼d.; special quality turning rod, 10
½ in. dia., in straight lengths, 4s. 2¼d. All prices

Other Metals.—Magnesium, ingots, 2s. 3d.
Antimony, English, 99 per cent., £190 0s. 0d. Q
ex-warehouse, £71 10s. 0d. Nickel, £600 0s. 0d. A
ingots, £180 0s. 0d.; aluminium bronze (BS1400),
AB2, £236.

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* *Average 68–70 per cent.*

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ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1243 POLASEK, J., and E. ZELINKA: Planning of Transport in Iron and Steel Works. *Hutnicke Listy* (Prague), 1958, July, pp. 626-631. (£5 15s. 0d.) The importance of transportation in iron and steel works for the calculation of the running costs. Transport of material into the works. The connection between the public railway system and the works and transport organization. Technical and economic factors; methods for solving the transportation problems of steel works. (Author's summary.)

1282 GAGIN, S. D.: Efficiency of Electric Steel Production by the Duplex Method of Oxygen Converter and Electric Furnace. *Kislorod* (Moscow), 1957, (6) pp. 1-11. (£4.) Conversion to duplex working is described and many results are tabulated. It is concluded that a cost reduction of 3 to 7 per cent. with a reduced capital investment of 12.2 to 15.8 per cent. could be expected. The supply of scrap was improved, furnace productivity could be doubled and the duplexing method gave more flexible working and better synchronization than O.H.-electric-furnace working. Top blowing with oxygen gave adequate dephosphorization. (ISI abstract.)

BISI 608 SAVEIKO, V. N.: Mechanism of Hot-tearing of Steel Castings. (£3.) pp. 241-251.

BISI 609 GRUZIN, V. G.: Pouring Temperature and Hot-tearing. (£2 10s.) pp. 252-260.

BISI 610 TRUBITSYN, N. A.: A New Method for the Determination of Linear Contraction, Stress, and the Resistance of Alloys to Hot-tearing. (£1 15s.) pp. 261-266.

Translations in course of preparation include:

1330 YUSHKEVICH, P. M., and S. A. FEDEROVA: Microstructure of Cast High-speed Steel. *Metallovedenie i Obr. Met.*, 1955, (3), pp. 21-25. (Included in response to requests received—List B 32.)

1365 KOPINECK, H.-J., *et al.*: Ultrasonic Testing of Products of the Iron and Steel Industry. *Stahl u. Eisen*, 1959, May 28, pp. 786-797.

1370 TROMMER, W.: Interaction between Steel and Moulding Materials. *Giesserei*, 1955, Aug. 18, pp. 433-440. (Abstract *JISI*, 1956, Sept., p. 90.)

1298 BANDOW, K. & K. WAGNER: A Contribution on Deoxidation and Desulphurization in the Cupola Furnace. *Giesserei*, 1958, vol. 45, (15), July, 17, pp. 409-417. (£5 5s.)

SUMMARY: Description of a number of tests and measurements demonstrates how the iron can be successfully deoxidized in the cupola furnace and the sulphur content favourably influenced at the same time. The deoxidizing effect was proved by the determination of the ferrous-oxide content in the slag. It is insufficient to take only one of the measurements mentioned in the hope of obtaining a favourable effect. Deoxidation and desulphurization are such complicated processes, depending on so many factors, that every measure must be considered and applied in order to obtain successful results. For instance, it is not satisfactory to believe that one can adequately reduce the sulphur content simply by increasing the manganese content without taking due account of the slag basicity, or to try to reduce the sulphur content solely by increasing the basicity, without previously lowering the ferrous oxide content in the slag. The problem must therefore be viewed in its entirety.

Provided that the cupola furnace is properly run and furnace conditions in general are satisfactory one may summarize the findings as follows:—

1. Deoxidation implies reduction of the ferrous-oxide content. It is advantageous to perform the reduction in the cupola furnace itself. In this way no loss of temperature occurs in the iron and the length of time available permits the separation of the deoxidation product from the iron.
2. Deoxidation leads to a lowering of the gas content in the iron, which is equivalent to a decrease in rejected material and an improvement in the quality of the iron.
3. Deoxidation leads to a lowering of the losses of burnt iron, silicon, and manganese, this being equivalent to a reduction of costs.
4. The lower content of ferrous oxide achieved by deoxidation increases the capacity of the slag to absorb sulphur, *i.e.*, there is an improvement in the desulphurization conditions, in other words, the quality of the iron is improved.
5. Deoxidized iron is more easily worked, which is equivalent to lower costs.
6. The increase in the slag basicity promotes both desulphurization and the reduction of the ferrous oxide content.

For the foundryman the following conclusions may be drawn for application in practice. To obtain optimum conditions with respect to the quality of the iron, to decrease losses of burnt material and also to achieve a certain uniformity the iron should be deoxidized in the cupola furnace. For this purpose a number of briquetted ferro-alloys are available with, however, a varying degree of efficiency. The best effects are obtained with calcium-silicon, ferro-manganese and silicon-carbide. Here it should be noted that the efficiency of the briquetted ferro-alloys is modified when used in the hot-blast furnace, deoxidation being dependent on the temperature.

With regard to desulphurization, optimum values can likewise be achieved if the iron is well deoxidized in the furnace. In this connection it is essential that the factors which promote desulphurization, *i.e.*, a higher-manganese content, a sufficiently high basicity of the slag, high furnace temperatures, etc., are adjusted to favourable values. Questions still requiring clarification must be investigated in further tests.

The initials HB, etc., stand for the organization to which enquiries for the following translations should be made, quoting the reference numbers—addresses are quoted at the end of this item

C.T.S. 335 ANAN'IN A. A. and B. P. CHERNOBROVKIN. A Cupola with Continuous-slit Tuyeres and Controlled Blast. *Liteinoe Proiz.* 1956, (1) pp. 10-13. (Abridged Trans. appeared in FOUNDRY TRADE JOURNAL, 1958, vol. 104, Jan. 30, p. 109.)

IRSID T 1246 (in prep) BIRYULIN, V. T. and V. O. SADOVSKII. Influence of Nickel on the Resilience of Austenitic Manganese-Steel. *Trudy Inst. Fiz. Metall.* 1956, No. 18, pp. 66-71.

B. COKE R.A. No. 42 3609 JUNGBLUTH H.: Coke Evaluation by the Cupola Furnace Test. *Giesserei*, 1955, vol. 42, No. 1, pp. 2-6. Trans. by F. Liebesny, B.Sc., A.L.A. Issued 1955, Oct.

B. COKE R.A. No. 58 3923 JUNGBLUTH, H.: Efficiency of a Cupola Furnace. *Giesserei*, 1956, 12 Apr. vol. 43, pp. 180-4. Trans. by F. Liebesny, B.Sc., A.L.A. Issued 1957, Jan.

HB 4452 KACHALKIN, G. S.: Study of Boron-alloyed High Chromium/Nickel (Hypereutectoid) Cast Iron. *Metallov Obra Met.* 1958. Dec. pp. 58-61. ($2.90.)

M. 321 LISITSIN, S. N.: New Method of Joining Cast-iron Pipes. *Vodosn. i. Sanit. Tekh.* 1959, 1, pp. 38-39.

SMT Mar. 15, 1959 LOPATKO, I. F. and USOSKIN, G. I.: Method of Measuring Thicknesses with the use of an Ultrasonic Pulse Thickness Gauge. *Zavods Lab.* 1958, (12) ($5.00).

HB 4518 MIL'MAN, B. S. *et al.*: Desulphurization of Liquid Cupola Iron by Magnesium. *Liteinoe Proiz.* 1958, vol. 9, No. 11, pp. 15-17. ($4.25.)

B. COKE R.A. No. 43 3616 NAVARRO ALCACER, J. and J. A. DE ANDRES. A Study of Combustion in the Cupola Furnace. *Giesserei*, 1955, vol. 42, No. 6, pp. 124-127. Trans. by F. Liebesny, B.Sc., A.L.A. Issued 1955 Oct.

HB 4563 NOVIKOV, I. I. and others: Grain of Solidifying Metal Refined by Vibration. *Liteinoe Proiz.* 1959, No. 2, p. 42. ($2.50.)

B. COKE R.A. No. 56 WESEMANN, F., U. GRAF and R. WARTMANN: New Way of Assessing the Strength of Coke by Sieve Analysis and Trommel Test. *Stahl u. Eisen*, 1956, vol. 76, pp. 133-144. Trans. by Z. K. A. Moszynski. Issued 1956, Nov.

Symbols for sources of translations:—

B. COKE R.A.: British Coke Research Association, Chesterfield, Derbyshire; C.T.S. and M.: DSIR Lending Library Unit, 22, Chester Terrace, London, N.W.1; H.B.: Henry Brutcher, P.O. Box 157, Altadena, California; IRSID: I.R.S.I.D., 185, Rue President Roosevelt, St. Germain-en-Laye (S-et-O), France; SMT: Soviet Metal Technology, 11, Bleecher Street, N.Y.12, N.Y., U.S.A.

Changes of address

The address of the London office of the WOLVERHAMPTON METAL COMPANY, LIMITED, is now 64, George Street, London, W.1. GEORGE SMART (FOUNDRY SUPPLIES), LIMITED, have removed to 227, West Regent Street, Glasgow, C.2. SMITHS AVIATION DIVISION has been transferred from Cricklewood to Kelvin House, Wembley Park Drive, Wembley, Middlesex. After more than 25 years at Ingate Place, London, S.W.8, STREAM-LINE FILTERS, LIMITED, are moving to new premises at Henley Park, Normandy, near Guildford, Surrey, the headquarters of the parent company, Vokes, Limited. The move is expected to be completed this month.

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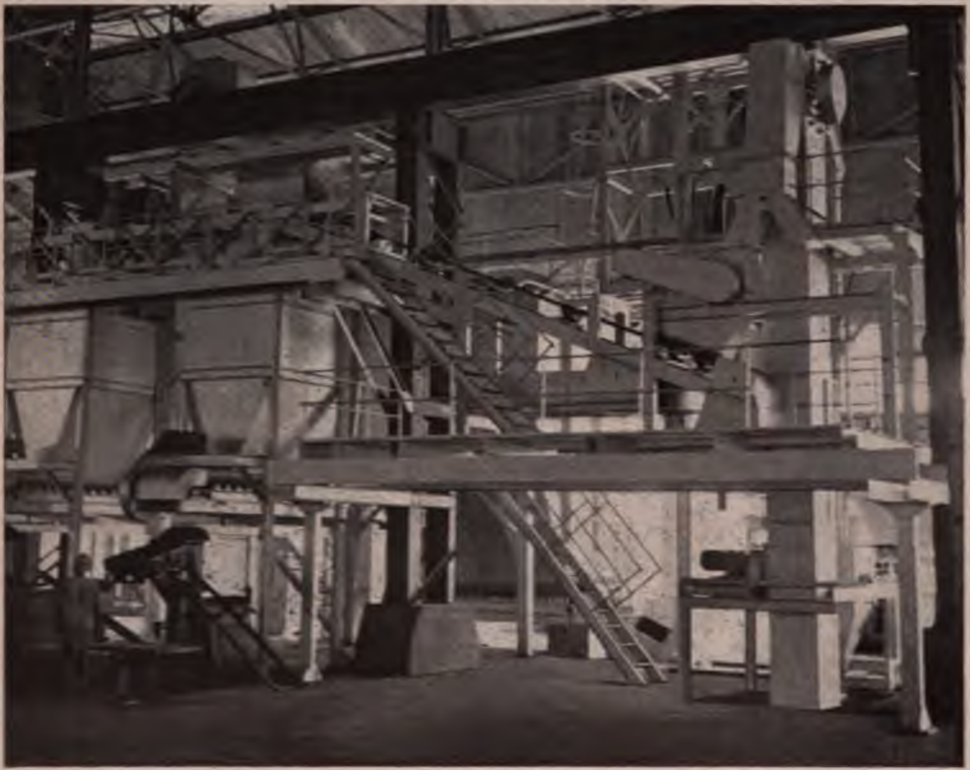
Photograph shows plant for conveying return sand into the bucket of a loader prior to charging an August-Simpson Mix-Muller. The mixed sand is then elevated, aerated, conveyed and distributed to large moulders' supply hoppers fitted with belt feeders. A cooling tower, also incorporated in this plant, ensures the efficient cooling of the return sand.



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Quality Labels

At a recent meeting of the European Committee of Foundry Associations it was proposed that quality labels for castings should be introduced into each country and then, after that, an international quality label should be established. This word "label," of French origin, has much the same significance as the "Kite" mark sponsored by the British Standards Institution. The range of foundry raw materials and finished products now carrying a label in France is indeed extensive, and unlike our system—with the unique title of "Kite"—each product is separately trade-marked. For instance, in the case of foundry blackings (*noirs de fonderie*) the name chosen is *Noirfran*. Two types are marketed in France, "mineral" and "stove" and the specifications covering their properties lay down for the first type the ash and volatile contents for three grades and for the second type, the volatile matter and carbon contents—also for three grades. Permission to use the label *Noirfran* is accorded to firms which guarantee conformity with the specification and which are registered on the official list of suppliers.

The products of some—if not all—types of French foundries are similarly trade-marked. For instance, so far, 58 ironfounders have been granted permission to use the label *Fontfranc*. The conditions for its use have been intelligently assessed and include the compiling of strict working records, using good working-methods, keeping well-organized stockyards, regularly employing cupola air-blast control, and the continuous use of the pyrometer. Dimensioned sketches as to how castings are gated also have to be kept.

This is a very important development, for, obviously, firms which have been granted permission to use these labels will use the fact as a basis for publicity. The scheme must also act as a spur to those who are at the moment insufficiently-well organized to comply with the conditions. So far as British iron foundries are concerned, we would estimate that between 200 and 250 are worthy of being accepted. If in the future there is to be a serious international market for castings, then the sooner this country emulates the French scheme, the better.

IBF National Works Visits Day

For the [illegible] year in succession, the Institute of British Foundrymen is to hold a National Works Visits Day and this year the London branch has made the necessary arrangements. These works visits supplement the arrangements already made by branches and those afforded at the annual conference, and in particular enable those members who cannot spare the time to attend the whole of a conference to take part in an annual national gathering.

Programme

The visits, which have been made possible by the kind agreement of a number of important founders in the London area to receive parties and to provide hospitality, will take place on Friday, October 30. Since travel in and out of central London is time-consuming and the foundries are well scattered, more whole-day visits than usual are included in the programme. Thus, of the six visits, four will be whole-day visits to single foundries; the other two will consist of a visit in the morning and a visit in the afternoon. Luncheon will be provided at a suitable place at mid-day. The schedule of visits is recorded in Table I.

Members are asked to indicate on a reply form which of the visits they prefer to attend and—as the number permitted in each party is strictly limited—their second and third choices. Coaches will leave from the Thames Embankment (north side of the river, between the end of Horse Guards Avenue and Charing Cross *Underground* Station) at the following times:--For visit "A," 8.45 a.m.; "B," 9 a.m.; "C," 9.15 a.m.; "D" and "E," 9.30 a.m.; and "F," 9.45 a.m.

Dinner

In the evening, there will be a dinner (informal dress) and entertainment at Lyons' Corner House, Tottenham Court Road (opposite the Dominion cinema theatre). The charge for each group of visits including transport by coach, luncheon, gratuities and administrative expenses is 21s., and the additional charge for dinner in the evening at the Corner House is 22s. 6d. Members who desire to participate are requested to return a reply form to the Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, 3, not later than Wednesday, September 30, or earlier if possible.

Those participating are required to make their own arrangements for hotel accommodation, and are advised to book at the earliest possible moment, and in any case not later than September 30—especially as the date of the visits is within the period of the Motor Show. As the choice of hotels in London is so wide, no block reservations or special terms are available to members.

Table I—*Works to be visited in the London Area by kind invitation of Directors and Managers of Each Company.*

Party.	Morning visit.	Luncheon and tea.	Afternoon visit.
A	Ford Motor Company, Limited, Thames Foundry (automobile and tractor castings production in highly mechanized foundry).	Ford Motor Company, Limited	Ford Motor Company, Limited, Dagenham Works (motor-car and tractor production).
B	K. & L. Steelfounders & Engineers, Limited (steelfoundry with special interest in steam, electric and diesel-loco work, long and medium production runs).	K. & L. Steelfounders & Engineers, Limited.	K. & L. Steelfounders & Engineers, Limited (if time permits, this company's facilities for machining castings and assembling cranes will also be inspected).
C	Langley Alloys, Limited (copper-base, nickel-alloy and aluminium castings by a variety of methods).	Luncheon: Langley Alloys Limited; tea: G. D. Peters & Company, Limited	G. D. Peters & Company, Limited (iron castings on both mechanized (to 4 cwt.) and batch production basis to 16 cwt.).
D	British Bath Company, Limited (mechanized bath manufacture and enamelling).	Luncheon: British Bath Company, Limited; tea: Le Grand Western Foundries, Limited.	Le Grand Western Foundries, Limited (jobbing and medium-run iron castings up to 3 tons; CO_2 process).
E	Broom & Wade, Limited (general engineering iron castings up to approximately 2 tons).	Broom & Wade, Limited. ..	Broom & Wade, Limited (continue tour of foundry, compressor and small-tool manufacturing shops).
F	R. & A. Main, Limited (speciality mechanized stove foundry (iron)).	R. & A. Main, Limited	R. & A. Main, Limited (cooker assembly and fitting shops; vitreous enamelling).

Information on Boiler Materials

The British Standards Institution has made a request for information on boiler materials. According to a statement in the BSI *News Sheet*, "Progress in the metallurgical field is leading to the use of new materials for the construction of domestic hot-water boilers and the BSI technical committee concerned with domestic-solid-fuel appliances has given consideration to the establishment of British standards covering the use of these new materials. A certain amount of information has been collected but, undoubtedly, there is a great deal more which is not yet available to the committee. An invitation is, therefore, extended to firms and organizations which have assembled the results of experience in this field to submit such data for consideration by the technical committee as soon as possible. Letters should be addressed to Mr. J. O. Lay, secretary, technical committee, SFE 13, British Standards Institution, 2, Park Street, London, W.1."

Forty Years Ago

The September 1919 issue of the JOURNAL carried an article by Mr. E. H. Broughall on the "Practical Use of Denseners and Permanent Moulds." At that time Mr. Broughall was foundry manager at Alfred Herbert, Limited, and in his excellent report he described the making at the company's foundry of a hexagonal turret in a permanent mould. This issue also carried radiographs of steel castings—probably the first ever to be published on this subject. Amongst new companies listed appeared the names of Davis & Brocklesby, Limited; Rustless Iron Company, Limited; and Millom and Askham Hematite Iron Company, Limited.

A NEW company, George Cohen (Dublin), Limited, has been formed to undertake general machinery trading in Ireland. The general manager of the new company is Mr. E. P. Purcell.

rgapur Steel Works and Foundry

A new steel works is being built at Durgapur, 118 miles from Calcutta, by the Indian Steelworks Construction Company, Limited (ISCON—a British consortium of thirteen manufacturing and electrical firms). Commissioned by the Indian Government, the works will cost £100,000,000 and is expected to be in operation by the middle of 1960. In the following article the individual departments, and equipment of the new foundry which forms a part of the works are described.

new Durgapur Steel Works foundry will be
d for the production of approximately
tons of ingot moulds, 5,000 tons of general
stings and 5,000 tons of steel castings per
Raw materials will include foundry iron
form of cold pig from the pig-casting
e, together with selected mill scrap and coke.
elting facilities will be provided by four
, each of ten-tons per hr. capacity, and iron
of up to 15 tons net wt. will be produced.
elting will be carried out in an electric-arc
of 6-ton nominal capacity. Non-ferrous
will be done in two gas-fired tilting-crucible
s of ½-ton, and ¼-ton, capacity respectively.
construction of the patternshop and iron
y is being programmed so that facilities will
ilable for the manufacture of the initial
of ingot moulds during the six-months period
the start up of the open-hearth steel plant.
ements are therefore being made for the
aining of the patternmakers and iron-foundry
el.

INTENDED LAYOUT OF THE FOUNDRY

Stock Bay

The cold pig-iron, together with mill scrap and coke, will be delivered by rail wagons to a stock bay, which will have space for one week's supply of scrap. Provision will be made for breaking standard cast pigs, but steel scrap will be cut to convenient lengths before leaving the rolling mills, and discard moulds to be remelted in the foundry will be broken before delivery. Materials will be charged direct into the cupola weigh-hoppers and arc-furnace charge-baskets by an overhead crane with grab or magnet.

Metal Melting

The four iron-melting cupolas will be arranged for mechanized bucket-charging in pairs, one cupola in each pair being operated each day. Thus 20 tons of molten iron will be tapped every hr., and iron castings of up to 15-tons weight produced. The molten steel from the 6-ton arc furnace will be

r of the wheel and tyre ingot-casting shop at the Durgapur Steel Works.

Last stages of shop erection (at the works of Davy and United Roll Foundry, Limited) of a 42-in. blooming mill destined for the Durgapur Steel Works.

tapped into ladles taken into the moulding bay by electric transfer-car. Space will be allowed for the installation of a second arc-furnace at a later date. The combined capacity of both furnaces will enable castings up to about 15-tons gross wt. to be produced. The non-ferrous crucible furnaces will feed hand-shanks for floor-casting.

Sand Preparation

A central moulding-sand preparation-bay will house one sand plant of 25 to 30-tons per hr. capacity (for ingot moulds and iron castings), one of 12 to 15-tons capacity (for steel castings), and one of 5-tons per hr. (for small moulds, facing sands, and sand for non-ferrous castings). Core-sand will be mixed in a separate unit of 3-tons per hr. capacity, but ingot-mould cores will be made from the same sand as the outer mould. Facilities for bonding additions will be provided in each sand plant, to cater for the diversity of properties in the basic sands.

View of the interior of the wheel and tyre ingot-casting shop at the Durgapur works.

Main Moulding-bay

The main moulding-bay will house all work on ingot-mould, large iron, and steel castings, including the moulding, closing, pouring and knockout operations. Fifteen sunken pouring-stations, with raised walkways, are to be provided for casting ingot-moulds; sand-mould assemblies will be transferred here when the cores and outer sand-moulds have been independently dried and brought together for pouring. All ingot-mould outsides, and cores, and all steel-casting sand-moulds will be dried in fixed stoves. Sand-moulds for large iron and steel castings such as slag pans, which cannot be machine- or box-moulded, will be dried by means of portable stoves. General foundry-tackle castings, and ingot-mould bottoms, will either be cast in open sand or will be box-moulded and dried. Cranes to handle box moulds of 35-tons wt. will be provided to serve the main moulding-bay.

Small-castings Foundry

The small-castings foundry adjacent to the main moulding-bay, to which molten iron and steel will be supplied by ladle-transfer bogies, will cater for box-moulding by both machine and hand, and open sand-work. Non-ferrous-metal castings and cores will also be produced in this bay.

Moulding Machines

The layout of the moulding-floors and sand-plants will provide for considerable flexibility of operation within the limits of capacity of the moulding-machines. These machines will include one plain jolting-machine of 10-tons capacity, one rollover type of 2-tons capacity with one sand-slinger in the steel foundry, five sandslingers in the heavy iron-foundry for ingot moulds etc., and two $\frac{1}{2}$-ton jolt-rollover and two hand-operated moulding-machines for small iron and steel castings and non-ferrous castings.

Knock-out

e ingot moulds poured on any one day will d on one section of a 60 by 40-ft. static ut grid. This grid will be divided into five of 60 by 8-ft., each with its own sand- r and dust-collecting ducting, to which the fan may be connected by sections so that y's work may remain on the grid to cool week. Steel castings, and pit-moulded , will be transferred to a 40 by 5-ft. static ut grid, whilst small iron-, steel- and non-metal castings will be knocked out on a ft. vibrating grid, or on the floor for heap tioning of the sand.

Fettling

ferrous castings will be taken by transfer o the fettling shop, where the ingot-moulds dressed by hand (using portable electric s and pneumatic chipping-hammers). Intricately-cored castings will have the sand removed by Hydroblast, while medium iron and steel castings will be cleaned on a swing-table Wheelabrator. The Hydroblast will have both an externally-operated, and an inside, gun. Small castings will be fettled with hand-tools on benches, or against grinding wheels, and will be cleaned in a Wheelabrator Tumblast machine.

Ancillary Plant

A foundry laboratory will be provided for the routine control of the cupola- and arc-furnace metal analyses, and sand-mixes, only. All the mechanical testing, however, will be carried out in the central laboratories of the project. A pattern-shop is being provided with machines and hand-tools for wooden patternmaking, and some non-ferrous-metal patternmaking. The gas-fired stoves and furnaces will burn semi-purified coke-oven gas containing hydrogen sulphide, having a calorific value of 450 to 500 B.Th.U's per cub ft.

---

y Methods of lity Control

By Kenneth J. Haycock

The technical resources at the command of the foundryman today are considerable, but it was not always so. To look back with condescension on the efforts of our predecessors is very easy; but let it not be forgotten that they were working by trial and error, and the intelligent application of results. They did not do too badly!

niques and methods developed in the early f the foundry industry were often closely- d secrets, concealed by cabalistic mumbo- Without the benefits of trade and research tions, textbooks and journals, our predeces- ere slowly building the foundations of -day knowledge. Our forefathers were apable of using modern technique, and only to-day's accumulated knowledge.

Assessment by "Rule of Thumb"

following most interesting account was a century ago by a forgotten pioneer named —

ien cast-iron is fractured, it exhibits a grey sometimes approaching to dull white, and, er cases, to dark grey, with spots nearly The lustre is sometimes metallic, resem- freshly-cut particles of lead lying on the ; and, in other cases, there seem to be in the iron disposed in rays.

ien the colour is a uniform dark-grey, the tough, provided there is also metallic lustre; there be no metallic lustre, the iron, though ill be more easily crumbled than in the case. The weakest sort of soft cast-iron re the fracture is a dark hue, mottled and ot shine.

e iron may be accounted hard, tenacious, ff, when the colour of the fracture is lightish grey with a high metallic lustre. When the tint is light grey without metallic lustre, the iron is hard and brittle. If the hue is dull white, the iron is more hard and brittle than in the last case. When the fracture is greyish white with small radiating crystals, the iron is of the extreme degree of hardness and brittleness.

"The best way to try the quality of cast-iron is to strike its edge with a hammer. Should the blow make a slight impression the iron must be in some degree malleable, and, if the specimen be uniform, it may be regarded as good for machinery; if, on the contrary, the hammer makes no impression and fragments fly off, the iron is brittle, and consequently, bad. The soft cast-iron yields readily to the file after the outer crust had been removed, and is, in a cold state, slightly malleable.

"The quality is also easily judged, when in the melted state, from the nature of the agitated aspect of its surface. The mass of fluid seems to undergo rapid circulation within itself, including a constant tremor on the surface, having the appearance of an ever-varying network; when this network is minutely subdivided it indicates soft iron. If, on the contrary, the iron be thrown up in large convolutions, the quality of the metal must be hard."

These early applications of a sort of quality control were the basis of the foundry industry's present vast accumulation of techniques.

Costing of Patterns

Mr. John L. Carter (cost consultant to the Gray Iron Founders' S Incorporated, of America), in an article entitled "Policy and I in the Handling of Pattern Labour and Expense" presented i *Iron News,* **gives some useful hints as to how problems whic should be tackled. The following abstract has been made from his**

Charging for New Patterns

It is the custom of the foundry trade for buyers of castings to pay for the production of patterns, and their maintenance in proper condition. In the majority of cases the customer either makes his own patterns, or buys them from master patternmaking shops; alternatively, the customer may ask the foundry to quote together for castings and pattern equipment required.

Casting-plus-pattern quoting

In dealing with such inquiries a foundry may quote a price for the castings which includes the cost of the pattern equipment. However, there are many objections to this practice from the point of view of both seller and buyer. The principal objection is that a fair comparison of quotations made on this basis is difficult, because some foundries may count on absorbing the pattern cost in the cost of the first order, and others on spreading the pattern cost over the total quantity which the customer is expected to order over an extended period of time. A foundryman who is very hungry for business may estimate probable future requirements at such a totally unrealistic figure that, in effect, he comes close to omitting the cost of the pattern equipment altogether.

It is hardly necessary to point out that the spreading of pattern cost over anticipated future requirements is a very risky policy. There are many reasons why the anticipated future orders may never come through, such as:

(1) The customer may not sell as many of the products, in which the casting is used, as he expected to. (2) The casting design may be altered, and new patterns required. (3) The line of products in which the casting is used may be abandoned. (4) The job may be lost to a competitor. In addition to these objections, there is the possibility that some foundries will substantially under-estimate the cost of the patterns for various reasons. Also, the type or quality of the pattern equipment used by different foundries may vary.

Separate Costing is Clear-cut

In the old days, the practice of absorbing the cost of the patterns in the casting price was fairly common, but as foundries have become more cost-conscious this practice has been abandoned by firms. Most buyers, as well as sellers, have come to realize that separate prices on castings and patterns provide the most clean-cut, fair and business-like basis for deciding between competitors. Quality, as well as price, is an important factor in buying p and separate prices enable the buyer to intelligently.

Quality, Service and Price should be the p considerations in selecting a source of sup castings.

Charging for Mounting Patterns

A somewhat similar situation arises w founder receives an unmounted pattern f customer and decides to mount it (or make pattern from it), and make the casting on a ing-machine. He may either:

(*a*) Offer the customer a reduced price if pay for the improved pattern equipment, o

(*b*) Make no reduction in price, make t proved pattern equipment at his own expe pocket the savings from the reduced cost may in some cases amount to considerabl than the cost of the improved pattern equi There is nothing unethical about the second but there are certain considerations which, writer's opinion, make the first course hig ferable. These are:

(1) It makes a good impression on a cust show him how he can save money on his cas improved pattern equipment, improved design, or in any other way.

(2) If the founder charges the customer based on hand-moulding, and a competitor a lower price based on machine-mouldi customer may think he has been deliberate charged.

(3) It is usually necessary to get samples a whenever new patterns are involved, and cases the customer is bound to be aware fact that different pattern equipment has bee

The above considerations should carr weight when expenditure for improved equipment is substantial, but they do not a simple "flatbacks," which can be easily n on a board and removed when the order pleted. However, even in these cases, if the runs are short the cost of gating and m should be considered carefully.

Control of Pattern Costs

The best way to effectively control patte is to set up the pattern department as a s cost division, with a complete set of depar accounts. The value of this procedure in

of Patterns

n of costs would alone make it worth-ut it also has the following advantages: e separation of pattern costs from casting kes the records of both more accurate, and etter control. When a separate pattern cost is not in existence many items of pattern ch as "material," "supplies," "repairs," even "direct labour," are usually so mixed casting costs that they are lost sight of, ctically no control is exercised over them. ecords of profit on pattern sales stimulate ontrol of costs on customers' patterns, and rn labour and expense.

for Close Control

reat many foundries the control of pattern nd expense is very loose and ineffective, or otally lacking. Yet it is exceedingly worth-or the following reasons:

killed patternmaking labour is expensive.

efficient scheduling of a patternmaker's time aste of time.

e efficiency of a patternmaker's performance to decline unless it is systematically super-d checked.

good deal of pattern work that should be charged to customers is likely to be to "foundry expenses" unless care is

me customers may provide consistently old tisfactory patterns, that are continually in small repairs (which are not charged to the r, but which mount up to a considerable cost period of time). Such a situation must be d.

ontrol of casting costs will be much more if it is not confused by the inclusion of n labour and expense."

Latest Foundry Statistics

r-base Castings. The June *Bulletin* of the ureau of Non-Ferrous Metal Statistics reports put of copper-base castings during June was ns and that for the half year it was 36,645 ompared with 37,293 tons in the first six months

Castings:—According to a special *Bulletin* y the British Iron and Steel Federation, the weekly production of steel for making steel during June was 10,200 tons. For the month the estimated weekly average output of steel was estimated at 3,700 tons.

R LESS THAN two years ago Shell-Mex & BP, established a big oil storage and distribution n the port of the Tees, the use of which has d so rapidly that a big extension scheme g the capital expenditure to about £1,000,000 n approved. More new storage tanks with s of up to 12,000 tons are to be built by , Limited, Darlington. Four and a half miles are to be laid and the work is due for com-in the autumn of next year.

Botting Material and Casting Defects

Mr. A. D. Morgan, in Report No. 506, on "Cupola Botting Materials and their Relation to Casting Defects" (published by the British Cast Iron Research Association), discloses work which stresses the great value of the Association to industry. From long experience, practical writers, like Mr. James Timbrell, have made sensible recommendations on botting procedures, but few of them ever connected defects in castings to bad botting practice. Mr. Morgan has made a simple calculation that a 2 tons per hr. cupola will deliver into a 5-cwt. ladle one pound of clay residue per hr. and this is a source of danger in promoting slag defects in castings—a source of trouble which has seldom been suspected. No fewer than 26 sorts of compositions from different foundries were tested in the Association's laboratory for firing contraction, fusion point and drying contraction and, of course, commented upon in a very useful "remarks" column. From this table of the Report now published and the excellent illustrations, it is easy to see which types of materials should be avoided.

The following quotation from the Report will serve to show its worth to the practical foundryman, based as they are on a scientific investigation:—"From these results and observations, it is possible to recommend materials for botting mixtures and their approximate proportions. (Type A mix is best used where frequent botting is employed on small cupolas, and type B where long gathering periods are used and a larger taphole is employed).

Type A.

Fireclay (30 to 50 per cent, clay grade) plus coal-dust (low ash 11 per cent. max. Superfine grade) 10 to 20 per cent. or sawdust (medium-fine sawings) 2 to 10 per cent.

Type B.

Fireclay (30 to 50 per cent. clay grade) 50 per cent., black sand (silica coresand) remainder, coal-dust (low ash 11 per cent. max., fine grade) 10 to 20 per cent. or sawdust (medium to coarse sawings) 2 to 10 per cent.

The materials are best mixed when dry in a bucket, and water is gradually added with thorough beating and kneading before use. It is preferable to prepare the stiff mixture the day before use and keep covered with a wet sack.

(The proportions given above are similar to those recommended by Timbrell." (FOUNDRY TRADE JOURNAL, 1941, **64**, June 5, p. 377, and 1946, **78**, January 24, p. 93)).

Machine-tool Industry looking-up

Considerable improvement in the trend of the UK machine-tool industry is indicated by the figures for new orders during May. In the domestic market there was a rise of over 20 per cent. in the volume of orders, and export orders in May were also substantially higher. The industry's total order-book increased by £1,250,000 to £51,660,000. The May home market orders were £6,166,000. compared with £4,935,000 in April and £4,171,000 in May, 1958.

Deliveries also rose—to £5,229,000 in May, compared with £4,854,000 in April and £4,996,000 a year ago. The order-book at the end of the month was £937,000 higher than in April, but £13,772,000 down on a year ago and it has as far again to go to reach the peak of August, 1956.

Equipment and Supplies

Bale-out Furnace for Aluminium

The industrial department of the West Midlands Gas Board have recently been giving consideration to the design of bale-out furnaces normally used for melting and holding aluminium. Gas-fired units were often inefficient in operation and did not present the best of conditions for the operator, who was in close proximity to the furnace throughout the whole of the working day. During the development of prototypes, therefore, particular attention has been paid to fuel consumption, and comfortable conditions for the operator (see Fig. 1).

Description of Prototypes

In order to improve the overall efficiency of the furnace, a recuperator has been included which utilizes the outgoing flue gases to preheat the air for combustion. The burner is of the air-blast type, using air at pressures of 14 to 20 in. w.g. The recuperator, together with the necessary gas governor, back-pressure valve, and motorized valves for temperature control, have been accommodated within the main casing, thus providing a neat and compact "packaged" unit ready for connecting to the appropriate gas and air supplies. With slight modification, it would be possible to accommodate the fan unit within the main casing, although, generally speaking, most die-casting shops have one or more blowing fans serving several holding-pots. In order to maintain a reasonably cool casing a generous amount of insulation has been provided, and the flue is of the double-wall type of construction providing an annulus for cold air to flow around the flue proper.

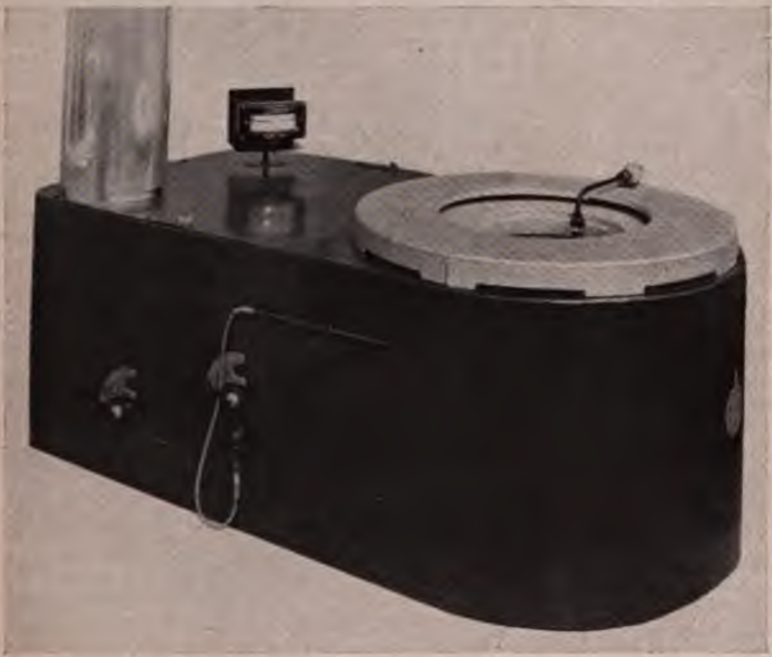

FIG. 1.—*Prototype bale-out furnace for melting and holding aluminium, developed by the West Midlands Gas Board.*

Cheaper than Electric Unit

Two sizes of furnace have been constructed as prototypes, the first having a capacity of 150 lb. and the second a capacity of 300 lb. The 150-lb. furnace has been in extensive use in a large die-casting shop, and a comparison made with a similar-sized electric unit showed that the running costs for holding with a small amount of melting were much lower with the gas-fired unit. Incandescent Heat Company, Limited, of Smethwick, Staffs, are one of several firms who are prepared to quote for these designs.

Double-insulated Drills

Wolf Electric Tools, Limited, Pioneer Works, Hanger Lane, London, W.5, have introduced double-insulated drills for industry: DI-K2c ¼-in. capacity general-duty, DI-K12c ¼-in. capacity low-speed, and DI-K3c ⅜-in. capacity general-duty, drills. In addition to the normal insulation incorporated in standard electric tools, the drills have a second independent insulation between the current-carrying parts and the outer casing. This has been done by completely lining the body and handle with an insulating shell. The drill switch-cover is made of toughened glass fibre, and an insulating sleeve is fitted between the armature shaft and windings. The ventilation fan is moulded from plastic, and the entry bush and cleat made from nylon. The insulation of every unit leaving the works is finally tested at 400v.

Sand Testing

Foundry Suppliers, Limited, 25a, Cockspur Street, London, S.W.1, have available an apparatus on which it is possible to test the rigidity of green cores by traversing a standard core specimen along a roller conveyor until it fractures, then measuring the length of core broken off. A second apparatus which has been introduced is for the evaluation of actual specific surface of sand samples in sq. cm. per gm. It is used in conjunction with a sieve analysis. Both machines are made by George Fischer, Limited.

THWAITES ENGINEERING COMPANY, LIMITED, Cubbington, Leamington Spa, announce that they are now marketing a new streamlined Nimbus 15-cwt. diesel dumper, with improved load-moving capacity and a lower centre of gravity.

BAKELITE, LIMITED, 12, Grosvenor Gardens, London, S.W.1, announce the publication of their advance information sheet E.32, which gives full details of three new low-cost epoxide-resin hardeners now being marketed by the company.

DOHM, LIMITED, 167 Victoria Street, London, S.W.1, have developed a new polythene heavy-duty bucket which is claimed to be non-corrosive and virtually unbreakable. Obtainable in battleship grey, the bucket is specially designed to withstand the roughest treatment. It has a reinforced top rim, sides and bottom, and a full-sized lip makes it easy to pour liquids and mixes of all kinds.

opean Investment Casters' Conference

of Proceedings at Essen: May 31 to June 3

Following the pattern of recent times—when successive annual conferences have been held in Holland, the UK, and Paris—this year's annual meeting of European investment founders was held in the German industrial centre of Essen, with German investment founders acting as hosts. Mr. John Bolton, secretary of the British Investment Casters' Technical Association (BICTA), attended the conference and has supplied the following special report on the general proceedings.

sixth European conference of investment
s was held in Essen from Sunday evening,
to Wednesday, June 3, and was attended
delegates from 10 countries, many of the
s being accompanied by their ladies. The
nme included an informal reception on
day evening; an official welcome on behalf
civic authority of Essen and the German
ent founders; 12 specialist lectures and one
interest lecture on art castings of about
r 1800; the annual business meeting; two
competitions; a visit to the Krupp research
ries; a most delightful annual dinner (with
o brief speeches); a visit to the Villa Hügel;
nple opportunities for informal contacts
form so valuable a part of such inter-
l gatherings. The ladies were entertained
tseeing tours and visits to places of interest
around Düsseldorf and Essen, as well as a
derground at a coal mine. It is difficult
gine a more profitable and enjoyable con-

Under the presidency of Mr. H. J.
mp van Embden, of N.V. Philips Gloei-
fabrieken, the proceedings were conducted
noothness and informality. To the presi-
wn outstanding linguistic ability there was added the amenity of an excellent simultaneous translation service for the technical sessions.

The *Haus der Technik* at Essen, where all the meetings were held, is an excellently appointed centre for the holding of technical conferences. Several suites of rooms are available, the largest lecture hall having a seating capacity of 1,000, in tiered seats. Each seat is equipped with a built-in microphone and a push-button switch to operate a signal light on a console at the chairman's table. The chairman is thus able to connect each speaker's microphone in turn to the simultaneous, three-language translation service. The quality and scale of the visual-aid equipment is also of the highest order, and the disposition of microphones at the speaker's rostrum is such as to enable him to move from lecturer to demonstration bench or screen, without affecting his audibility. Apart from the lecture halls, the *Haus* also contains a refreshment room, and other amenities appropriate to a first-class conference centre. No apology is made for interposing this eulogy of the meeting accommodation at Essen, for British readers, in particular, will unfortunately be all too familiar with the inadequacy of proper conference facilities in the United Kingdom.

f the delegates and ladies attending the 1959 *European Investment Casters' Conference at Essen.*
entre is Mr. H. J. Meerkamp van Embden, president, with Dr. W. Tofaute of Fried, Krupp (left)
ektor E. M. Shönböck of Gebr. Bohler & Co.

European Investment Casters' Conference

Opening Ceremony

The conference was formally opened on June 1 by the president, Mr. Meerkamp van Embden, who was followed by the Mayor of Essen, Oberbürgermeister Wilhelm Nieswand, who welcomed the delegates and their ladies to Essen, and emphasized the efforts which the city authorities are making to make the town a centre for international technical meetings. A welcome on behalf of the German investment castings industry was given by Professor Dr. R. Scherer, president of the board of management of Deutsche Edelstahlwerke, Bochum. He surveyed the development of the investment castings industry in Germany and pointed to its vast potentialities in the future, providing, as it does, a method of machine construction giving an unprecedented freedom of design in an unusually wide range of materials.

Annual Business Meeting

Hitherto the organization behind these European conferences of investment founders has been quite informal, and has been largely dependent upon the enthusiasm, initiative and ability of Mr. Meerkamp van Embden in consultation with the industry in the host country. It is true that reference to a European Investment Casters' Association has been made for several years, but in fact no such formal organization—as understood in British industry—has been constituted. The continuing success of these meetings has, however, made it necessary that some revision should be made with a view to relieving the president of his heavy burden of duties, and to ensure future continuity.

Ways and means of achieving this end were discussed at the business meeting held in the afternoon of June 1, and informally during the conference, with the result that before the end of the conference the president was able to announce that agreement had been reached with each of the national groups for the establishment of a committee which is to be responsible for the organization of the 1960 conference in Belgium, and with presenting specific proposals for the future constitution of the international organization. This committee will comprise: Mr. Meerkamp van Embden (president); Mr. P. Chevé (Société des Acieries et Forges de la Loire); Mr. B. J. Helders (N. V. " Industrie "), treasurer; Dr. K. A. Krekeler (Gebr. Böhler & Company); Mr. P. Mathy (S.A. Usines Gilson); and a representative from the United Kingdom. In the meantime the necessary finances are to be secured by donations from companies who participated in the conference.

Next Conference

The 1960 conference is to be held in Belgium, at the invitation of M. Mathy, during the first few days of July, 1960, where the primary topic for discussion will be the design of test-pieces and the mechanical properties of investment-cast material. Invitations were extended to the British Investment Casters' Technical Association and the *sub-committee for investment* castings of the *Verein Deutsche Giessereifachleute* to report to the next conference on their activities, particularly in relation to national specifications.

Mr. Meerkamp van Embden also announced the arrangements he had made for the issue of *Proceedings* of the 1958 and the present conference and paid tribute to the facilities for publication which had been placed at the disposal of the organization by the FOUNDRY TRADE JOURNAL.

Attention was also drawn to the need for a literature abstracting and information service being available to investment casters throughout the world. In this connection Mr. J. Bolton, of the British Investment Casters' Technical Association, spoke of the publication, *Investment Castings Abstracts*, published by the Association to members (by arrangement with the British Steel Castings Research Association) and undertook to explore the possibility of this service being made more widely available.

Arising from the presentation of the paper by M. Mathy earlier in the conference, agreement was reached that an attempt be made prior to the next conference to collect data from participants on the low-temperature impact properties of investment-cast plain-carbon and low-alloy steels.

Castings Competitions

The holding of competitions for investment castings has become a regular feature of these conferences, two diplomas being offered; one in respect of the best example submitted and the other for the casting exhibiting the greatest potential for the future development of the process. Each contestant is allowed a few moments at the meeting to describe his exhibits and to advance his claims, and each company represented at the conference is allowed one vote in each contest.

The contest on this occasion was held in the afternoon of June 2 and attracted entries from eight companies, namely: Gebr. Böhler & Company, Düsseldorf; Société des Forges et Ateliers du Creusot, Paris; Deutsche Edelstahlwerke, Bochum; Firth-Vickers Stainless Steels, Limited, Sheffield; N.V. " Industrie," Vaassen; Microfusion, Paris; N.V. Philips Gloeilampenfabrieken, Eindhoven; and Trucast, Limited, Farnham Royal. The winner in both sections of the contest was declared to be Dr. E. G. Nickel of Deutsche Edelstahlwerke for his entry of a rotor casting of exceptional quality and design, and the presentation to him of the diplomas was made by the president at the annual dinner held on the same evening.

Annual Dinner

The dinner, attended by about 120 delegates and their ladies, was held in most charming surroundings at the Schlosshotel Hugenpoet at Kettwig, the guests being received by the president and Mrs. Meerkamp van Embden and by Mr. and Mrs. E. M. Schönböck and Dr. and Mrs. W. Tofaute representing the German hosts. In a brief speech delivered in German, French and English, the president expressed the pleasure and thanks of the conference participants to German investment founders for their generous hospitality; his remarks

upported by Mr. J. Aherne Heron; and Mr
öck responded.

Technical Sessions

twelve technical papers presented for dis-
at the conference occupied seven sessions.
letails of these papers are provided in the
ng review:—

itude of Gunsmiths to Investment Castings

P. *Mathy* (*Société Anonyme Usines Gilson*)

author explained that gunsmiths in Belgium
be divided into three groups: (*a*) the " one-
family businesses offering high-quality pro-
in very small quantities; (*b*) small manufac-
employing between 10 and 100 persons and
g good-quality products; and (*c*) very large
acturers who have established extensive
ne-shop capacity for quantity production.
rst category, he said, was of little interest to
vestment founder because of a complete lack
ndardization; the second group at present
led the best market; but the third classifi-
offered the greatest potential if certain
lices could be overcome. These prejudices,
d, were (*a*) the mistaken belief amongst users
he anisotropic properties of wrought com-
ts were advantageous; (*b*) that claims for the
sional accuracy of investment castings had
overstated in former years, and machining
till required; (*c*) the surface quality (due to
urization) of investment castings in some
ials was disadvantageous; (*d*) in some instances
were required in quantities too large for
mic production by investment casting. M.
maintained that investment founders were,
ght to be, in a position to dispel most of these
lices. For example, the isotropic properties of
gs were definitely advantageous, particularly
his true with respect to impact properties;
er, so far insufficient quantitative data were
ble to convince the engineer. Furthermore,
e decarburization could be overcome by
s case-hardening.

second part of the paper propounded a pro-
ne of investigation which the author recom-
ed should be carried out by collaborating
ries in different countries with a view to pro-
data on impact properties. This programme
initially require standardization of the test-
rm and would include determination of the
on impact values of the carbon content of
carbon steels; and the influence of heat-treat-
and trace elements in plain carbon, Ni/Cr,
i/Cr/Mo steels and cobalt alloys.

atten-Cordonnier System for the ssification of Technical Literature

C. *Jouwersma* (*Philips Gloeilampenfabrieken*)

s paper described a punched-card system used
e author's company for indexing technical literature, including a large volume of patents specifications covering a wide range of subjects. He explained how, by expert selection of subject classifications, the system provided a simple-to-use index which ensured comprehensive retrieval when reference was needed, and illustrated his remarks by some typical demonstrations. Mr. Jouwersma drew attention to the apparent absence of an international literature-information service related specifically to investment castings.

Mr. Meerkamp van Embden and Direktor Shönböck drinking the toast to the German hosts at the Conference dinner.

Position of (German) Specifications for Investment Castings

By Dr. E. G. Nickel (*D.E.W.*)

Dr. Nickel's paper disclosed that the technical committee established by German investment founders has collaborated with users in the preparation of a comprehensive range of steels suitable for investment casting, the choice having been made primarily in relation to ease of casting and machining. The materials selected had been based on normal commercial types of steels, but compositions had been modified where necessary with a view to improving founding properties, thereby providing an improved product. The steels agreed upon so far were: Case-hardening steels (four compositions); heat-treatable steels (four compositions); nitriding steels (2.3 per cent. Cr; 0.15 per cent. Mo; 0.1 per cent. V); tools steels (five compositions); corrosion-resisting steels (seven compositions); and heat-resisting steels (five compositions).

Some progress has also been made towards

On the left, Dr. E. G. Nickel of D.E.W. is cribing one of the two prize-winning castin submitted in the castings contest at the Confe On the right are his castings; they won first in both sections of the contest—for the best ca and for the casting showing the greatest po ality for the process. The rotor casting is app mately 12- to 15-in. diameter.

determining the mechanical properties of these materials in investment-cast form. A design of separately-cast test-bar (with the feeder-head situated over the gauge-length) was to be adopted, and the programme of testing on which the industry was now embarking had been designed to study the effect of heat-treatment and decarburization on properties, and the variation of properties with section thickness.

Estimation of the Temperature of a Melt

By H. J. Meerkamp van Embden (Philips Gloeilampenfabrieken)

After reviewing existing optical methods depending upon measurement of total and surface radiation, and immersion pyrometry techniques (which it was explained were expensive and required skilled supervision), the author described a method and equipment which had been evolved by his company. In this, 2-mm. dia. Pt/Pt-Rh thermocouple wires were insulated by unfused refractory (such as magnesia) which in turn was encased in a nickel tube, the whole being swaged down to a small diameter, and closed at the end to be immersed in the melt. The whole length of the noble-metal thermocouple was thus continuously insulated and protected by the nickel sheath, and was sufficiently flexible to be conveniently wound on to a small pistol-grip drum which could be carried by the operator. The purpose of the nickel sheath was to prevent contamination from slag covering the melt; but on contact with the melt itself the t the sheath was melted and the liquid metal fo the hot junction across the thermocouple w Separate nickel caps were provided to re-seal end of the thermocouple after each dip.

Advantages claimed for this method were gr speed and ease of operation, less skill required, an accuracy equal to the best immersion-pyron practice. Contamination of the thermocouple avoided and the consumption of precious-metal was reduced, since no more than 1 cm. nee removed at one time. The author did not contamination of the melt by nickel was like be a serious disadvantage, but, if necessary, native sheathing materials could be found. presentation of this paper was accompanied practical demonstration.

Investment Casting Alloys for Serv at Elevated Temperatures

By D. R. Wood (Mond Nickel Co. Ltd.)

This paper which had previously been prese at the BICTA Annual Conference* in Lon reviewed the available iron-, cobalt-, and ni base alloys of particular interest, and reported on tensile properties; resistance to high-temper stress rupture; fatigue; and oxidation rates. improvement in the mechanical properties Nimocast 258 and an experimental nickel-base attendant upon vacuum melting was also ref to.

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* Printed in the JOURNAL of June 4, pages 663-668.

Technical Communication between Investment Founders and their Customers

By R. Schwedes (Lawrence Laboratories Inc., USA.)

Mr. Schwedes, who is president of the Investment Casters' Society and a director of the Investment Castings Institute of America, gave a detailed description of the organization of a "Design Clinic" conducted by these two Societies at Santa Monica, California, on March 17 last, which attracted an attendance of over 200 design engineers and other representatives from user industries. Admission was by invitation distributed through sales organizations of participating investment founders, the view being taken that this first conference should be directed towards increasing the knowledge of existing customers rather than trying to extend their number directly. The programme consisted of an exhibition of castings and four lecture-sessions on design, applications, alloys and specifications (acceptance standards).

Investment Casting of Precious Metals

By P. E. Gainsbury (Mond Nickel Co. Ltd.)

This paper reviewed modern methods employed for the production of dental and jewellery castings in noble metals and alloys. The author indicated certain techniques used in these industries which he thought might, with appropriate modifications in some cases, be applicable to the production of engineering castings. He explained the use of rubber dies which were applied on account of the highly intricate nature of the castings being made and the short length of production runs; a technique for pressure pouring using steam pressure; single-coat investment techniques, and the use of vacuum rather than vibration for consolidation of the investment.

Metallurgy of Steels and High Alloys

By R. Waindle (Wai Met Alloys Company, Detroit)

Mr. Waindle prefaced this lecture with a review of some trends in the US investment castings industry. He said that design engineers were coming to the conclusion that the tensile test was an inadequate criterion of assessment, tending to favour wrought materials. Ductility and impact value were tending to be preferred to tensile, but were not sufficiently understood. For example, in comparative assessments of cast and wrought cutting tools, the cast cutters had only 20 per cent. of the impact value of the wrought products, but gave three times the "life." Conventional laboratory assessment would have resulted in these castings being discarded. In the aircraft industry, cast materials with zero transverse ductility were being used regularly and successfully.

Mr. Waindle said he did not agree with the current emphasis on nickle-base super alloys, for not only were they difficult to handle in the foundry, but were subject to corrosion and oxidation effects in service, in some cases grain-boundary oxidation—"green rot"—had occurred after only 50-hr. service. His own view was that cobalt-base alloys were to be preferred at temperatures exceeding 1,000 deg. C. As regards surface protection, progress was being made in the application of aluminium cladding to alloys for turbine blading. Its advantages included: (*a*) up to 50 per cent. increase in resistance to thermal shock; (*b*) improved creep resistance; (*c*) improved resistance to erosion; (*d*) the fact that alloys having good castability but whose properties were not regarded as being sufficiently good for present conditions of service, could be reinstated.

Figures were provided on the rapid rate of adoption of the ceramic-shell technique of investment. A recent survey had disclosed that 14 out of 28 companies in America were now using the process or on the point of doing so, and 13 others were investigating its application.

Mr. Waindle said the automotive gas-turbine was in active development for industrial vehicles in the USA. Some three years ago it had been thought that little progress would be made in the employment of investment castings in this field on account of the high cost, but in fact the most-expensive vacuum-cast nickel-base alloys were now being specified.

On the subject of vacuum casting, the author said he was of the opinion that the improved properties claimed for vacuum-cast material were at least partially due to the improved standards of production control inherent in the technique. He considered, alternatively, that alloying techniques could result in equivalent improvements in properties and would be cheaper.

Wax Moulding and Dimensional Tolerances

By C. Nieuwenhuis (Philips Gloeilampenfabrieken)

The chemical and physical factors affecting the dimensional accuracy of wax patterns were described, with reference to a U-shaped test-piece. Table 1 was presented to indicate the improvements effected by better control, mainly of temperature and injection pressure.

TABLE 1.—*Dimensional Variations Attained in U-shaped Test-pieces Before and After Improvement of Technical Control.*

Wall thickness, mm.	"Free" Shrinkage (along axis), mm.		Restricted Shrinkage (around inner surface of U), mm.	
	Before.	After.	Before.	After.
1–2	0.2	0.1	0.15	0.08
2–5	0.4	0.15	0.3	0.12
5–10	0.6	0.25	0.5	0.2

The relevant factors were found to be poor thermal-conductivity of waxes; very high liquid-shrinkage; solid contraction (always less than liquid shrinkage); mode of solidification—whether pronounced crystalline structure or not; injection pressure.

European Investment Casters' Conference

Selling Investment Castings

By J. Zwerner (Durox, Geneva)

In this paper—which was presented, in the author's absence by M. Denain—a number of examples were given of investment casting having replaced other methods of production. In some cases, the initial cost of the investment castings had been higher than components manufactured by other means, but this had been offset by savings in assembly operations, or machining, or by improved performance in service.

Dies for Investment Castings Patterns

By E. Hengler (Carp and Hones, Düsseldorf)

An account was given of the techniques employed in the production of dies using soft metals. machined steel, metal spraying, rubber, plastics and the electro-erosion techniques. Cost comparisons were made in terms of the capital equipment required and the service life of the pattern. It was shown that design factors, length of production-run and accuracy required, had an over-riding influence on the choice of method, but for casting quantities below 1,000 off, the order of choice would be: first, soft metal; second, sprayed steel; and third, machined steel—the last being about four times the cost of spraying. When quantities in excess of 5,000 were required, soft-metal dies were unsuitable because of wear, and when quantities in excess of 10,000 were specified, sprayed-steel dies might be eliminated from consideration if close tolerances had to be held and if the design included much coring.

Ethyl Silicate as a Binder for Refractory Materials*

By J. Evans (Monsanto Chemicals, Ltd.)

In the absence of the author of this paper, by J. Evans (Monsanto Chemicals, Limited), was presented by Mr. N. L. G. Thomas. It showed that ethyl silicate and silica sols were now well established as satisfactory binders for refractories and investments, but that waste could occur if carefully planned formulations were not properly understood. Various hydrolysis and gelation techniques were described to show the versatility of the materials and to indicate how, by small adjustments, considerable improvement in properties could be secured. It was suggested that a better understanding of the large range of possible formulations might suggest new applications for these materials.

Art-founding of Cast-iron, in the 19th and 20th Centuries

By (Miss) Dr. S. Theisen

Since the beginning of the 19th century cast-iron has been used more and more in constructional designs, and also for casting statues and objects of art. Before that time ornamental cast-iron had been used mainly for oven plates only. The first example of art work was an ornamental cast-iron tombstone for the Count of Einsiedel. This job opened a wide field of application for the lost-wax process. In constructional work several bridges and buildings were made, *e.g.*, the cupola of the Corn Exchange in Paris. In smaller work many castings for ornamental work, and even jewellery (Geiss from Offenbach, who lived in Berlin) were made. Next came the development of round and oval medals bearing the portraits of well-known personalities. In the second half of the century there was a decline in the art as many cheap ornaments came on the market. Nevertheless, cast-iron might well be an appropriate material for modern artists, for example Matares' animal figures or some of Moore's works of art.

Closing Session

The Conference was formally closed by the president at midday on June 3, Mr. Meerkamp van Embden paying tribute to all those who had contributed to its success. A vote of thanks to the president was proposed by Mr. John Bolton.

In the afternoon of that day a visit was made by a number of congress delegates and their wives to the Krupp Research Laboratories and to the Villa Hügel—the former home of the Krupp family and now a museum.

Iron-ore Imports

IMPORTS of iron ore and concentrates (except chrome iron ore and roasted iron pyrites) in July, and the totals for the first seven months of this year and last, are shown in the table below. The figures for 1959 are not completely comparable with those for 1958.

From	Month ended July 31.	Seven months ended July 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Sierra Leone	102,000	449,979	387,746
Canada	409,872	1,130,251	985,229
Other Commonwealth countries and Eire	1,446	2,397	9,600
Sweden	323,102	2,035,807	1,703,943
Norway	25,003	185,273	155,998
France	41,919	310,410	270,590
Portugal	14,390	82,117	126,234
Spain	42,737	414,150	298,261
Algeria	95,634	946,916	848,217
French West Africa	15,797	266,069	133,341
Tunisia	33,025	381,878	308,403
Morocco (including Tangier)	32,075	350,443	230,328
Liberia	36,060	196,745	213,573
Venezuela	49,365	972,154	680,448
Brazil	50,958	346,826	315,128
Other foreign countries	21,334	168,225	99,698
TOTAL	1,294,717	8,239,640	6,766,737

A SHIPMENT of a gas-making plant recently left Stockton-on-Tees for Rostock, eastern Germany. Manufactured by the Power Gas Corporation, Limited, it was the first plant to be shipped direct from Stockton to an Iron Curtain country.

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* This paper, also, had been previously presented to the BICTA *Conference in London* and is shortly to be printed in this JOURNAL.

Section devoted to the technology of producing
DIMENSIONALLY
ACCURATE
CASTINGS

Silica Binders for Investment Casting*

By J. I. Evans, M.Sc., A.R.I.C.

Each of the stages of the investment-casting process has its own technology and specialists. This article deals with the binders that are used in mould manufacture, each of which has its own advantages and disadvantages. An appreciation of the chemical background is often helpful to the user, and it is proposed to outline that of the silica binders, particularly ethyl silicate and silica sol—theory is related to practice, and suggestions are made for the close control of the various processes.

The modern version of the "lost-wax" process, now better known as investment casting, has developed during the last fifteen years. There is evidence that a lost-wax process was used by the Early Egyptians, and during the Shang Dynasty in China. Its subsequent progress is not clear, but in the sixteenth century the sculptor, Benvenuto Cellini, cast figures in bronze, silver and gold using a lost-wax process. At the beginning of this century it was again re-discovered as a method for making dental fillings and inlays; contributions to its development have also been made by the jewellery trade.

INVESTMENT-CASTING PROCESS

The first application of the process in recent years is often quoted as the production of turbine blades or buckets for the superchargers of the Flying Fortress aircraft. Turbine blades for jet engines followed naturally from this, the process being ideally suited for the large-scale production of awkwardly-contoured shapes in tough, heat-resistant alloys. To-day, investment casting has become accepted as a versatile metal-forming technique which enables design staffs to develop dynamically-preferred shapes without considering machine shop practicability; expensive assemblies previously welded from several components can be consolidated into a single integral part, and intricate cored passages, cores, lids, etc., may readily be incorporated.

Various Applications

Reduced to its barest essentials the investment-casting process consists of making a disposable pattern, surrounding this with a refractory powder (which is subsequently bonded into a solid mass), removing the pattern, and then pouring the metal into the resulting cavity. Each of these different stages has its own technology and specialists. It is the purpose of this paper to deal only with the binders that are used in mould manufacture. There are many: Plaster of Paris, magnesium phosphate, sodium silicate, silica sol, and ethyl silicate. All find application, each has its own advantages and disadvantages. An appreciation of the chemical background of these binders is often helpful to the user, and it is proposed to outline that of the silica binders, particularly ethyl silicate and silica sol; the theory is related to practical applications, and suggestions are made whereby close control is possible of the various processes involved in their use.

Ideal Binder Properties

The properties of the ideal binder for investment casting may be summarized as follows:

(*a*) It must not contribute any contaminants that lower the refractoriness of the mould, and it must be completely inert at the operating temperatures.

(*b*) The slurry of filler and binder must be sufficiently fluid to allow efficient packing around the pattern.

(*c*) The slurry should set within a controllable time to give a mould of high green-strength.

Ethyl silicate and silica sol meet these requirements, both being a convenient source of silica in a form suitable for binding refractory shapes and moulds. Although the details of the process used with each are different, the underlying concepts are similar and may conveniently be dealt with together.

Chemical Processes Involved

Ethyl Silicate

The esters of ortho silicic acid $Si(OH)_4$ were first studied by Pellini[1], although they were first prepared by J. A. Ebelman in 1846. The acid has been isolated only at low concentrations, and the esters are usually prepared by reaction of the appropriate alcohol with silicon halide. Ethyl orthosilicate is

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* Paper presented at the first annual conference of the British Investment Casters' Technical Association, which was held at Connaught Rooms, London, on May 11 and 12. The Author is on the staff of Monsanto Chemicals, Limited, of Fulmer, Bucks.

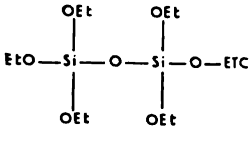
Silica Binders for Investment Casting

formed by the reaction between silicon tetrachloride and ethyl alcohol:

$$SiCl_4 + 4C_2H_5OH \rightarrow (C_2H_5O)_4Si + 4HCl$$

Ethyl orthosilicate is also referred to as tetraethoxy silane, tetraethyl orthosilicate, or more simply as ethyl silicate. It has a silica content of 28 per cent.

If the alcohol contains water, then some hydrolysis of the ethoxyl groups to hydroxyl groups occurs, with subsequent condensation giving polymers of the following general configuration:



$$EtO-\overset{OEt}{\underset{OEt}{Si}}-O-\overset{OEt}{\underset{OEt}{Si}}-O-EtC$$

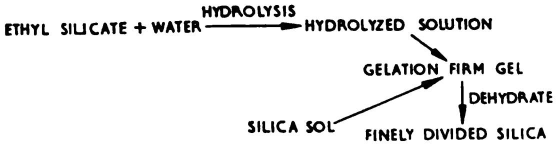
The silica content of condensed ethyl silicate is about 40 per cent., and for this reason an ester of this type is preferred in many applications; it is available commercially as Silester O. The applications of condensed ethyl silicate depend upon its hydrolysis to polysilicic acids, with subsequent gelation and dehydration to hard insoluble silica. The hydrolysis is slow in neutral solution, but is catalyzed by both acid and base.

Silica Sol

In the silica sol the silica is present as small particles of colloidal dimensions suspended in water. Recent improvements in manufacturing techniques have enabled sols to be made with silica contents up to 30 per cent. Silica sols are available commercially as Syton C and Syton 2X, which have silica contents of 15 and 30 per cent. respectively. The silica particles in Syton 2X are smaller than those of Syton C; both sols have excellent storage stabilities. These sols resemble in some respects the acid hydrolysed solutions of ethyl silicate and, with the exception of the hydrolysis stage, the sequence of operations is essentially the same for each.

Sequence of Operations

The various stages may be summarized as follows: —



The additional step to hydrolyze the ester is therefore considered separately.

HYDROLYSIS

The hydrolysis of ethyl silicate involves the conversion of the ethoxyl groups to hydroxyl groups by reaction with water:

$$Si\ (OC_2H_5)_4 + 4H_2O \rightarrow Si\ (OH)_4 + 4C_2H_5$$

In neutral solution the hydrolysis proceed slowly, but is accelerated under both aci alkaline conditions. Acid hydrolyzed soluti general are relatively stable, but may be gel neutralizing their acidity; alkaline hydrolysis solutions that gel spontaneously without addition. Both types of hydrolysis are u refractories technology, but the alkaline hydr gelation is conveniently treated in the section ing that on gelation of acid hydrolyzed solu

The acid catalyst normally employed is mercial concentrated hydrochloric acid (S.G. at a concentration of 0.05-0.5 per cent. vo on the final solution. Because ethyl silic immiscible with water, the hydrolysis is carried out in a mutual solvent such as ethyl a or isopropyl alcohol; their binary water-azeo which are cheaper, are also suitable provide allowance is made for the water already pres the alcohol.

The miscibility curves of the ternary s ethyl silicate/alcohol/water are given in Fig. the left of the curves lines AX_1, AX_2, A mixtures are homogeneous; to the right sepa occurs initially, but miscibility tends to be re as the reaction proceeds with formation of alcohol and the conversion of the ester to silicic acids.

The hydrolysis is accompanied by a rise i perature, the magnitude of which will d upon the volume and surface area of the the rate of stirring, evaporation rate, etc. preferable to allow the hydrolyzed solution to overnight before use. Typical hydrolysis f lations are set out in Table 1. These are all on the theoretical minimum water requireme complete hydrolysis, *viz.* 15 per cent. vol./v ethyl silicate.

TABLE 1.—*Typical Hydrolysis Formulations.*

	Parts by volume.				
I.M.S. 64 O.P. SG 0.818	63.4	48.9	34.4	—	—
I.P.S.2 SG 0.815 ..	—	—	—	65.0	53.0
Water	1.6	4.1	6.8	—	—
Silester O	35.0	47.0	58.9	35.0	47.0
Per cent silica (approx.)	15	20	25	15	20

Stability

The storage stability of these hydrolyzed sol is dependent upon a number of factors; max stability is achieved under the following condit

(*a*) Low temperature; by lowering the ter ture from 30 to 5 deg. C. the period of st may be increased ten times; intermediate ter tures increase the life correspondingly.

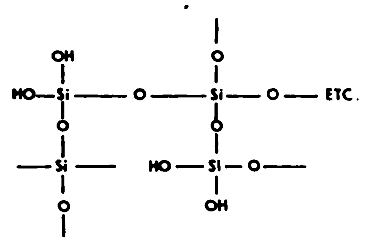
(*b*) Acid concentrations within the range 0 0.5 per cent. are preferable; at lower conc tions silica tends slowly to settle out of sol while high acid concentration causes pren gelation of the entire solution.

(*c*) Low water, high alcohol and low silica tents all enhance storage stability; these facto usually fixed during preparation, but jud

n of the various combinations may allow a ljustment before use, *e.g.* initial water con- ion may be kept low, extra water being later.

Molecular Structure after Hydrolysis

ng hydrolysis the ethoxyl groups of the will have been hydrolyzed to hydroxyl , resulting in large polysilicic acid molecules, of highly-branched structures with a degree s-linking, a simple molecule being represented



se hydrolyzed solutions bear some resem- to the silica sol in which the hydrated silica esent as small particles. According to n[2] the silicon atom attempts to retain the edral configuration, with the result that the e of the silica particle is heavily hydrated, nay be represented as shown in Fig. 2. is an obvious similarity between this concept silica particle and that of the large mole- f polysilicic acid. The formula of the silica e may be written $(SiO_2)x(H_2O)y$, and it may wn[3] that for a particle 10 millimicrons in dia- x = 11,500 and y = 1,240. For a smaller parti- nillimicron in diameter—invisible even in the n microscope—x becomes 11.5 and y = 12.4. composition of the silica particle then ches that of polysilicic acid $(SiO_2.H_2O)n$. is therefore a strong similarity between a yzed solution and a silica sol, and the nism of the subsequent gelation stage is ally the same.

GELATION

In both cases the binder solution, either hydrolysed ethyl silicate or silica sol, is mixed with the refractory filler, the resulting slurry being poured around the pattern and allowed to set. This solidified version of the silica sol or hydrolyzed solution is called a gel; the transformation to this form can take anything from a few minutes to several months or even years. Hurd[4] has sumarized the various theories which have been advanced to explain the formation and structure of silica gels. These include the emulsion theory, the cellular theory and the fibrillar theory; because of the wide variety of silica gel structures that may be formed it is quite likely that silica gels can be found which conform to any one of these theories. There seems little doubt that silica gels can result from the linking-up of molecules of polysilicic acid, or by aggregation of silica particles of colloidal size. This is further justification for considering together the gelation of both the silica sol and the hydrolyzed solutions of ethyl silicate.

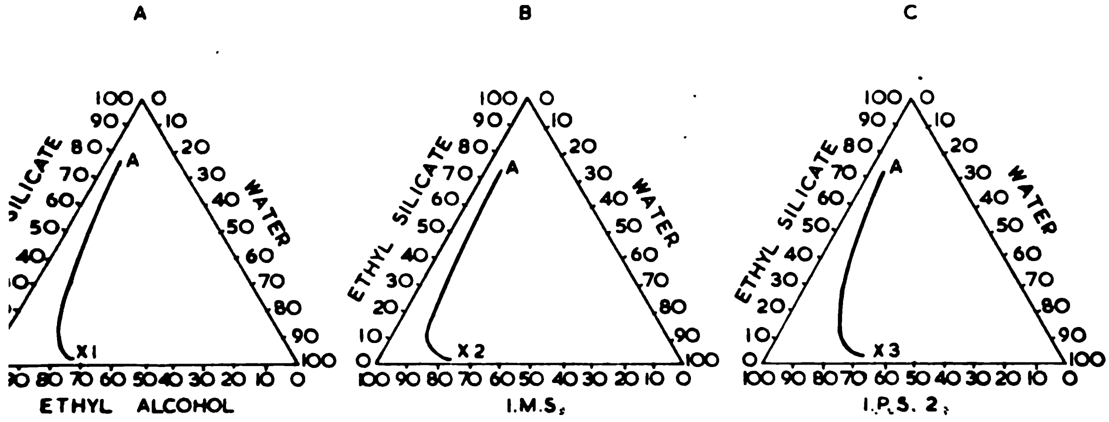
Rate of Gelation

The rate of gelation of these silica systems depends upon a number of factors, but the most important for the present purpose is pH. The general relationship between the logarithm of the gelation time and pH is shown in Fig. 3 (*a*). Maximum stability or longest time to gel occurs at a pH between 1.5 and 2.0; gelling is most rapid at pH 5-6. Below about 1.5 the stability decreases again, while above pH 6 it increases again up to a pH of about 11. These are, of course, general trends, the actual gelation time of any solution depending upon other factors as well.

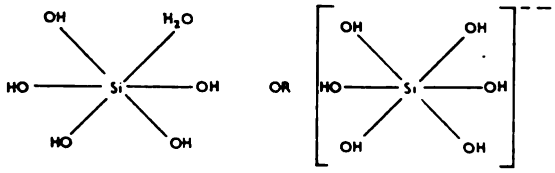
Various Theories

Several explanations have been advanced for this behaviour and these have been reviewed by Iler[5]. Flemming[6] first demonstrated that the gelling of silicic acid is catalyzed by both H^+ and OH^- ions. To account for this, Iler[6] suggested that below pH 1.5 the reaction rate is catalyzed by the fluoride

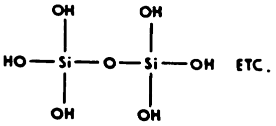
.—*Miscibility curves of ethyl silicate and water with* (*a*) *ethyl alcohol,* (*b*) *I.M.S., and* (*c*) *I.P.S.2.*



ion F^-; traces of fluoride impurity are almost invariably associated with silica. The fluoride ion is similar in size to the hydroxyl ion OH^-, which catalyses the reaction above pH 1.5. Thus, as the pH rises above this value, the OH^- ion concentration increases, and the rate of gel formation increases accordingly. In the presence of the OH^- ion the co-ordination number of silicon, it is suggested, rises from 4 to 6, resulting in configurations which have been written as:



This highly reactive intermediary will then combine with another similar molecule or with $Si(OH)_4$ to give:



—The silicon atom can also increase its co-ordination number to 6 when combined with the F^- ion, which is similar in size to the OH^- ion. A rise in pH corresponds to an increase in OH^- concentration, the rate of gelation thus becoming more rapid up to pH 5 to 6; above this the OH^- ion concentration has increased to the extent where OH^- ions begin to be adsorbed by the molecules or particles; the negative charge reduces the number of collisions and the rate of gel formation decreases again.

Gelling the Different Binders

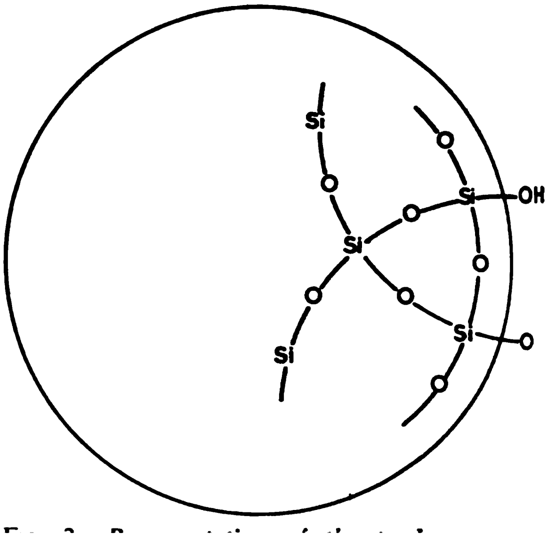
The solutions formed by acid hydrolysis of ethyl silicate lie on the peak of the graph at about pH 1-2; the silica sols on the other hand are on the alkaline side of neutrality, and owe their stability to the negative charge on the particles. The adjustments necessary to gel the two types of binder solution are therefore rather different. With the hydrolyzed solutions the pH must be raised to the unstable region where the OH^- ions catalyze the rate of gelation. The silica sols may be gelled either by reducing their pH to the same region or by adding a solution containing positively-charged ions. By neutralizing the charge of the particles such a solution causes extremely rapid gelation, although the actual speed will depend upon the number of positive charges carried by the cations and by the concentration of the solution; adjust- [illegible] pH of the sol does not cause immediate [illegible] application of these [illegible] though the

Filler Alkalinity

After preparation the hydrolyzed solution [illegible] mixed with the refractory filler, the selection [illegible] which will have an important bearing on the proper- ties of the final mould. Each foundry has its [illegible] preferences for filler type and grading, and [illegible] subject is outside the scope of the present discus- sion; filler alkalinity is the only property which [illegible] of interest, and this will have some bearing on [illegible] behaviour of the investment slurry. The reason [illegible] this is that the hydrolyzed solution is caused [illegible] by neutralizing its acidity, thus increasing the [illegible] the unstable region. The filler is not nor[illegible] sufficiently alkaline, and the practice has be[illegible] add finely-divided magnesium oxide during [illegible] blending process. Although insoluble, the m[illegible] nesium oxide gradually neutralizes the hyd[illegible] chloric acid, and the entire mould finally sets to [illegible] firm, rubbery consistency. This method is qui[illegible] effective, but control of gelation time is not possible by control of rate of magnesium oxide addition. This is illustrated in Table 2. The second and third columns of Table 2 record the gel times of a filler/binder mix at two levels of magnesium oxide concentration. There is little [illegible] significant difference between the two. This table [illegible] does illustrate, however, a method whereby gel time can be controlled; the left-hand column speci- [illegible]

TABLE 2.—*Gel Times with Magnesium Oxide as Accelerator.*

Percentage water added to solution.	Gel times (min.)	
	0.5 per cent MgO.	1.0 per cent MgO.
0.0	120	120
1.0	75	65
2.0	50	40
5.0	25	25
7.5	14	12
10.0	10	8



[illegible]

extra water added to the hydrolyzed solu- mediately before mixing with the filler; this s in excess of that required for complete 'sis, *i.e.* 15 per cent. vol./vol., and the gel ›f the mixtures decrease with additional

Magnesium Oxide Addition

:ason that control of the magnesium oxide is ineffective in controlling gel time is een by examination of the titration curve ssium oxide against an N/10 solution of ›ric acid (Fig. 3 (*b*))—strong base against cid. The pH changes rapidly between and 8 for very small changes in the mag- xide concentration; Fig. 3 (*a*) demonstrates hat gel time is controllable by pH only ıe range 4-6. With magnesium oxide as or it is obvious that, provided the con- n is greater than the minimum for ıtion, then the actual excess has no effect on time. If, however, a weaker base than ım oxide is used for the neutralization, ıt the neutralization point will not be as the gelation less rapid. By the addition her quantity of a base of suitable strength, ible even to vary the time of gelation with ınt of base added.

f Base Additions

ılain this, consideration must be given to ion after complete neutralization by a e of the free hydrochloric acid used for s. Further addition of the base estab- equilibrium between free base and its salt ; this state is exactly similar to that of ing neutralized by an acid. A plot of pH :id added gives an S-shaped curve usually o as a titration curve; this is defined by:

$$pH = pKa - \log \frac{[salt]}{[base]}$$

Ka is the logarithm of the reciprocal of :iation constant of the base, and [salt] and : the concentrations of salt and free base ıly. It should be appreciated that the first rs to the strength of the base employed, and determines the position of the curve on the pH scale. The second term shows the manner in which the pH is affected by increasing the added acid, and shows that the relationship between added base and pH, and therefore gel time, is a logarithmic one.

Experimental Titration Curves

The above theory strictly speaking applies to aqueous solutions of moderate concentration; to obtain data in keeping with the application under investigation practical experiments were carried out. The following comments apply more correctly to this experimental data. Practical examples of these titration curves are shown in Fig. 3 (*c*), which shows curves for the bases pyridine (pKa = 5.3), triethanolamine (pKa = 7.8) and piperidine pKa = 11.1). The position of the comparatively flat portion of each curve is determined by the pKa of the base; it is on this section that the pH of the solution may be adjusted by varying the amouht of added base. The practical implication of these curves is that, by suitable choice of base, it is possible to vary the pH, and hence the gel time, of an acid hydrolyzed solution within the required range. This is illustrated in Table 3; the first column gives the percentage vol./vol. of a 6 N pyridine solution which was added to an acid hydrolyzed solution of ethyl silicate, with the resulting pH and gel time given in the second and third column respectively.

TABLE 3.—*Gel Times with Pyridine as Accelerator.*

Percentage vol./vol. of 6N pyridine.	pH.	Gel time (min.).
0.68	3.0	4 days
1.6	4.0	15 hr.
8.0	5.0	90 ,,
10.0	5.2	50 ,,
12.0	5.4	40 ,,
14.0	5.6	35 ,,
18.0	5.8	28 ,,
26.0	6.0	26 ,,

The actual gel time will, of course, depend on other factors such as silica concentration, ambient temperature, etc., but this table does demonstrate that a measure of control is possible which could not be achieved with an incorrectly selected base.

).—*Graph showing the of pH on the gelation of silica systems.*

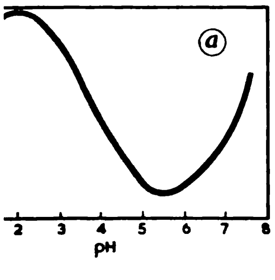


FIG. 3 (*b*).—*Graph showing the effect of magnesium oxide on a standard acid solution.*

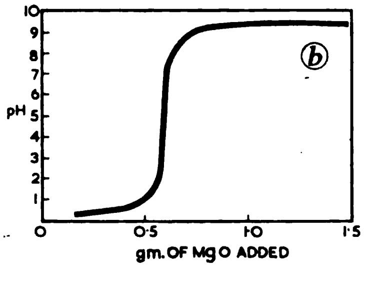
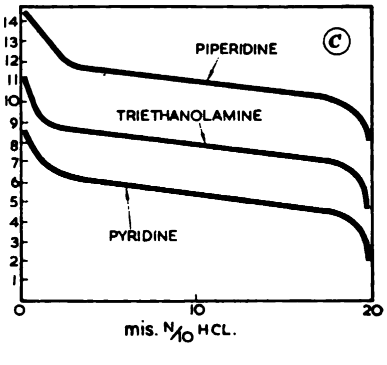


FIG. 3 (*c*).—*Graph showing the effect of acid addition on the pH of standard amine solutions.*



Silica Binders for Investment Casting

Effect of Age on Solutions

The effect of age on solutions of 15, 20 and 25 per cent. silica content is shown in Table 4; after 10 days ageing, the gelation times had decreased by about 20 per cent., which, although significant, should not prove a serious embarrassment to the investment foundry. These small changes with age can be compensated by an appropriate reduction in the quantity of accelerator, *e.g.*, with the 25 per cent. solution a gel time of 65 min. can be maintained over 10 days by successively reducing the pyridine addition from 10 to 6 per cent. Such adjustments in gelation time are not possible with the usual strongly-alkaline accelerators. Table 4 also shows the effect of increasing silica content on the behaviour of the hydrolyzed solutions; as would be expected, the solutions become progressively less stable as the silica content increases, consequently requiring less accelerator to achieve comparable gel times. Again, the use of a weak base as accelerator enables compensatory changes to be made.

TABLE 4.—*Variation of Gel Time with Age and Silica Content of Solutions.*

Percentage vol./vol. of 6 N pyridine.	Age (days).	Gel time (min.).		
		15 per cent SiO_2.	20 per cent SiO_2.	25 per cent SiO_2.
6	1	270	165	100
6	6	245	150	80
6	10	235	135	70
8	1	215	140	85
8	6	190	120	65
8	10	185	110	55
10	1	185	125	65
10	6	170	100	50
10	10	160	95	50

Effect of Various Amine Accelerators

That the other bases besides pyridine, *viz.* piperidine and triethanolamine, do not quite meet the requirements is illustrated by Table 5. In this case normal solutions of each amine were added to a hydrolyzed solution at three concentrations.

TABLE 5.—*Gel Times with Different Amines as Accelerator.*

Amine.	Gel time at various rates of addition		
	2 per cent.	4 per cent.	6 per cent.
Piperidine	10 min.	3 min.	1½ min.
Triethanolamine ..	80 min.	12 min.	6 min.
Pyridine	36 hr.	>3 hr. <15½ hr.	>3 hr. <15 hr.

The decreasing gel time as the pKa decreases is clearly illustrated at each concentration; the rapid change in gel time with concentration of the stronger bases is also evident.

Addition of Electrolyte

This method of gelation control is not applicable to the silica sols, which are situated on a different portion of the stability curve. They are prepared at pH 10 and their stability is reduced by lowering the pH; alone, this is not sufficient to produce a gel within a practicable time. Even at neutrality gelation can take up to 20 hr. Addition of electrolyte is more effective; the charges on the particles are neutralized and rapid gelation occurs. By lowering the pH of the sols it might be expected that they would become less sensitive to electrolyte addition. That this is so is illustrated in Table 6, in which the effect is seen of adding a fixed quantity of electrolyte solution to sols of different pH's.

TABLE 6.—*Influence of pH on Gel Time with Added Electrolyte.*

pH of sol.	Effect of electrolyte addition.
10.0	Immediate gel
8.2	2 min. to gel
6.1	72 min. to gel
4.1	2 days to gel
2.2	No gel

At pH 2.2 the sol has passed through the minimum stability region and is completely insensitive to electrolyte addition, its stability depending upon the absence of OH^- ions as catalyst rather than on mutual repulsion of particles.

Applications of Silica Sols

These properties provide the basis for the several applications of silica sols, both for investment casting and in other fields[7]. In one patent[8] silica sol is specified as the only binder for the investment; gelation is effected by calcium chloride, calcium carbonate, magnesium oxide, or magnesium carbonate at concentrations of 0.01 to 1 per cent. of the entire mix. Silica sol is also used with acidified sodium silicate in the manufacture of moulds with intricate, internal contours[9]. Considerable strength is required of such moulds, and the addition of silica sol enables this to be achieved without increasing the percentage of sodium.

Dip-coats

The sols are also used in the pre-coating slurries or dip-coats for the wax patterns. A very finely divided refractory is used as filler, and the chief requirement of the slurry is stability—the slurry should not gel, neither should the refractory settle out of suspension. No accelerator is necessary, and suspension is maintained by suitable choice of wetting agent. Ethyl silicate may also be used in dip coats, the essenial feature being stability and freedom from gelation. Again, pH control is important, although in this application a figure of 1.5-2.0 should be maintained. If the dip-coat bath is in continuous use, with intermittent topping up, it is important to maintain the acidity by addition of dilute hydrochloric acid at intervals. Residual alkalinity in the filler could easily cause a gradual drift upward of the pH, resulting in gelation of the whole bath, which is obviously most undesirable.

ALKALINE HYDROLYSIS GELATION

Hydrolysis will also occur under alkaline conditions, as already explained. The resulting solutions are unstable, and gel spontaneously within a comparatively short time of preparation. In certain ıtions this technique has advantages, notably f simplicity, one operation being required of two. The alkaline hydrolysis catalyst is · an organic amine, although certain metal are also effective. The amine is mixed ıe ethyl silicate, at a pre-determined concen- , to give a solution which will hydrolyze and adition of aqueous alcohol[10, 11]. Until such n is made the amine-modified ethyl silicate : stable and may be stored for many months, ed that damp air is excluded.

Choice of Amine

actual choice of amine is important, because are sufficiently alkaline to cause the hydro- › go rapidly to completion. Piperidine and ›hexylamine, either alone or in combination, ›een found suitable, the concentration used ling upon the gel time required. The latter rolled also by the aqueous alcohol; it is often ıient to make the amine modification in bulk, re-determining to some extent the subsequent n time of the ethyl silicate. Further small cations may be made by varying the aqueous l concentration. Table 7 illustrates the ons in gel time that may be obtained by l of amine concentration, or by the propor- f aqueous alcohol.

TABLE 7.—*Gel Time of Amine-modified Ethyl Silicate.*

rcentage peridine.	Percentage alcohol/ water mixture	Gel time (min.)
1.0	15	25
	20	20
	25	18
1.5	15	12
	20	8
	25	7
2.0	15	8
	20	5
	25	4½

, method[12] of using ethyl silicate has been sful in the manufacture of refractory objects s sagger-boxes and small furnace linings, and ecision piece moulds.

CONCLUSIONS

/l silicate and silica sols are now well estab- as excellent binders, both for refractories and nent moulds; in many cases, however, the '-thumb prevails over carefully planned lations, resulting in an unnecessary waste of ıive materials, and lack of operational control. oped that the suggested hydrolysis and gela- echniques are sufficient to demonstrate the .lity of these materials, and to show that even adjustments to an established process may considerable improvement. Furthermore, a understanding of the large range of possible lations may suggest opportunity for the use yl silicate or silica sols where previously they ›een thought unsuitable on functional or mic grounds.

›wledgments

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[12] Scott, H. F., and Emblem, H. G., *Refractories Journal* 1951, **27**.

DISCUSSION

The CHAIRMAN (Mr. W. Foyers, of H. & F. Precise Castings, Limited), thanked Mr. J. I. Evans for his paper, and then called upon Mr. Leadbetter to open the discussion.

MR. LEADBETTER (H. & F. Precise Castings, Limited), said Mr. Evans had mentioned certain accelerators and the optimum water contents necessary to produce a gel. Was there a range of these additions and water contents which could produce optimum gel strength? In view of the price of ethyl silicate, the best possible use had to be made of it. Also, what was the difference in the gel structure between the gel produced by a silica sol and the ethyl silicate?

MR. EVANS replied that it was not possible to specify conditions for optimum gel-strength without first defining the term. What exactly was it that the investment caster regarded as optimum? The difference between the gel structure of ethyl silicate and that of silica sol was possibly attributable to the method of formation. Ethyl silicate started off with large molecules which grew and resulted in a large tangled molecule, whereas in the silica sols, the particles were larger than the molecules and simply agglomerated, only joining where they touched.

MR. LEADBETTER added that he would have liked more information on gel strength because it was very important to the industry. Investment casters wanted a certain gel strength in as short a time as possible to give a mould that would withstand handling. At the same time, they required a sufficient silicate content to bind the particles. He knew from his experiments with ethyl silicate, that even with a constant silica content, gels of varying strength resulted. For instance, by using a very long gelling time, the gel produced eventually seemed to be weaker than one using the same silica content and a rapid gelling time. Mr. Evans had said that a certain definite amount of water was essential for complete gelation and he assumed that below and above that figure a weaker gel was obtained.

American Work

MR. EVANS, in a further reply, said much work had been done in the USA on minimum water contents for complete hydrolysis, using tetrethyl-orthosilicate; *i.e.*, the straightforward monomer. The work was therefore simplified; with ethyl silicate, there was a mixture of molecules, containing one or more silicon atoms. If one assumed an average chain length of five silicon atoms, a figure of 15 per cent. water for complete hydrolysis could be calculated.

A useful method of discovering whether hydrolysis had taken place was to flow out the solution on to a glass plate and allow it to dry. If it had not hydrolyzed it remained sticky; if it had hydrolyzed, then the solution dried off and a fine white powder resulted, which was silica. Above the minimum water content, the silica concentration decreased and the gel got weaker.

Presumably, said Mr. Leadbetter, the methylated spirit content could be reduced and the silica content kept the same.

Then, one returned to the definition of optimum gel-strength. Mr. Evans said the higher silica content, the stronger the gel; probably, the faster the gel time, the stronger the gel; with a very long gel time, drying out, rather than gelation, took place, and the structure was not as strong as if it had gelled and then dried out. It was difficult to determine in the laboratory exactly what strength of mould was required to give ideal properties, simply because these would depend on the shape, size, etc., of the mould.

Possibility of Heat Gelation

Mr. A. Dunlop (W. J. Hooker, Limited), said: reference has been made to acid-hydrolyzed solutions and the use of basic materials, such as magnesia, to control the gel. These were expensive materials and it was necessary to use them to the best advantage. There was another method of gelling, namely by the application of heat. It was possible to have a hydrolyzed solution which was quite stable, to invest the mould, consolidate by vibrating and pour off the slurry, and use it again in another mould. Then the mould was gelled by raising the temperature; he would like to have the lecturer's comments on that.

Regarding alkaline hydrolysis, reference had been made to the fact that pyridine might be added to the ethyl-silicate bulk. Then, the gel time was controlled by the amount of water added. Could the silica content be controlled by the addition of some non-aqueous solution? Was it always necessary to use the ethyl silicate at full strength—getting back to the question of cost. Could it be diluted, but not with "wet" alcohol; what liquid would Mr. Evans suggest as a diluent which would not affect the gel time?

Mr. Evans reported that he had no figures relating to heat gelation. Raising the temperature of the mould was an accepted method of causing gelation; it had the advantage that, when using a very wet slurry, the excess could be re-used; with an alkaline accelerator this was not possible. Regarding the adding of piperidine as an alkaline gelation, or alkaline hydrolysis-and-gelation-accelerator, the only method of lowering the silica content was to put in more alcohol as a diluent. It would require a certain amount of experimental work which was quite easy if done with straightforward solutions. For example, it could be done with very small quantities in test tubes—with 10 or 12 ml. of solution.

Mr. Dunlop said this must be done with water-free alcohol; it could not be done with methylated spirit, for instance, because more water was then added. The question was, how would the speaker dilute the silica content without affecting the gel time. Would he use wet alcohol for controlling the gel?

Gel time was best controlled by attention to the piperidine concentration, replied Mr. Evans. The silica content could, therefore, be lowered by adding more industrial methylated spirit, reducing the rate of piperidine addition to keep the gel-time constant. A compromise had to be reached on the amount of piperidine added and the amount of water and alcohol. That was one of the difficulties in accumulating this sort of information—there were so many variables which would affect the gel time of ethyl silicate that it was impossible to provide a table—a ready reckoner, as it were—giving all possible conditions which could be encountered. Each user, if he wanted to achieve small variations, would have to do a small amount of experimental work. It was the object of his Paper to indicate the lines which could be followed in order to make small variations in technique.

Mould Strength

Mr. G. Lyon (Fairey Aviation Ltd.) said the mould must be considered as an engineering structure and it was of interest to know its strength against the loads which it was called upon to bear. One of the primary factors in this would appear to be the tensile strength of the binder. If members could be informed of the range of tensile strength after firing, of the material shown by Mr. Evans in his test-tubes, it would be possible to indicate whether it was adequate.

Mr. Hope, replying, said that on the question of mould strength, when setting the moulds by using heat, the essential was that the mould acquired natural strength just by being wetted by a liquid, and did compact down into a very dense mould, having a high strength. Therefore, it was possible to put that mould into an oven and to set it off, and, at the same time, melt the wax patterns without the mould collapsing. When using a heat-setting technique, it was necessary to have a filler with an optimum packing property, for example, one containing a fine fraction of dense material, such as zircon.

Mr. Lyon had raised some further points about taking a typical hydrolyzed solution, mixing it with a round-particle-size silica sand in a certain proportion and vibrating the wet mix into the mould. Such a slurry would give an extremely low strength. If that same solution were mixed with a filler having an optimum packing property, then it would set into a very strong mould. Therefore, the question of the gel strength obtained from the hydrolyzed solution was not dependent only on the hydrolyzed solution, but was a function of the hydrolyzed solution and the filler.

Mr. Lyon thought this reply was not entirely satisfactory, because some fundamental value must be involved. Whereas the effect of keying between the grains of the refractory was appreciated, in some circumstances the strength of the mould depended on the tensile strength of the bond and not on the packing. Tensile failures of moulds were experienced and if investment casters knew more of the physical properties of the binder, *i.e.*, in tensile after the normal processing, it would take them further along the road to preventing burst moulds.

The Chairman said what Mr. Lyon was in fact referring to was that he would like to be able to make, within close limits, a strong or weak mould, depending on the application.

Mr. M. Riddihough (Deloro Stellite, Limited) held that possibly there was quite a technique set out already for testing this; also in the concrete industry, where concrete tensile specimens were prepared. One should be able to adapt that procedure under standard conditions to test the strength of investment binders.

On this aspect Mr. Evans replied that the bond-strength of ethyl silicate was best determined by using it to bind a filler and to carry out a tensile test (say) on a standard specimen. The strength depended upon so many factors that figures were meaningless unless related to definite conditions, specimen size, etc.

[This ended discussion of this Paper.]

Fulmer Open Day

Fulmer Research Institute held their annual Open Day recently at Stoke Poges, Bucks. Over 300 visitors attended, including many notable personalities from the spheres of research, metallurgy and metals engineering. The laboratories were open for inspection from 10.30 a.m. onwards, a buffet lunch being served in a marquee from 12.30 to 2 p.m. In the afternoon, the party was addressed by Mr. P. Horsfall (chairman of Almin, Limited—the firm originally responsible for the Fulmer Research Institute project), and afterwards thanks were expressed on behalf of the visitors.

The Institute differs from the usual research associations and Government laboratories in that it receives no annual grant or income, except in payment for services rendered. Since it is entirely free from Government control, no particular section of industry has any rights or priority in research results or facilities, a feature that often appeals to industrial sponsors who have no adequate research facilities themselves, but who wish to keep both their problems and aims confidential.

Tour of Premises

The JOURNAL's representative started his tour of the laboratories in the main building. Of particular interest was the cathode-ray polarograph on the first floor, and the work in progress on the oxidation of zirconium and zirconium alloys. There is a well-equipped corrosion laboratory on the same floor (containing all the standard corrosion-testing apparatus), and also apparatus for electro-chemical measurements.

Next on the list was the physics laboratory, where the original metallurgical work on age-hardening of aluminium alloys, supervised by Dr. Hardy, is continuing. Trace elements have been shown to exercise a profound effect on the ageing behaviour in some systems, and the influence of small quantities of cadmium in accelerating the ageing of aluminium/copper alloys led to the development of the aluminium/copper/cadmium alloys, which, while free from room-temperature ageing after solution-treatment, can be aged at slightly elevated temperatures to give properties approaching those of the Duralumin-type alloys.

The engineering laboratory is equipped to carry out all normal mechanical tests. In addition to impact and hardness machines, a Dennison 50-ton universal testing machine, with ancillary equipment for high- and low-temperature testing, is in use. Conventional creep-testing apparatus is supplemented by facilities for carrying out creep tests in compression, and in special protective atmospheres. This has proved essential in studies of compression creep of uranium and other highly reactive metals. Special equipment is frequently designed and manufactured here for use in investigations for which standard equipment is not adaptable.

Foundry

The tour concluded with a visit to the foundry, which is equipped with the normal oil- and gas-fired furnaces for melting. Apart from these, induction furnaces have been adapted for melting and casting in special atmospheres or *in vacuo*, and for zone refining as well as for open melting. Most reactive alloys for experimental work are prepared in argon-arc melting furnaces with water-cooled copper hearths. One of these is equipped with a retractable hearth, from which small billets suitable for extrusion can be made. An apparatus has been constructed for melting by electron bombardment, and is used for zone refining and growing single crystals. Work is being done on the development of low-oxygen stainless-steels, and oxidation-resistant low-alloy steels are being developed. There is a large-scale enamelling furnace (see Fig. 1) and spraying unit, and other heat-treatment furnaces.

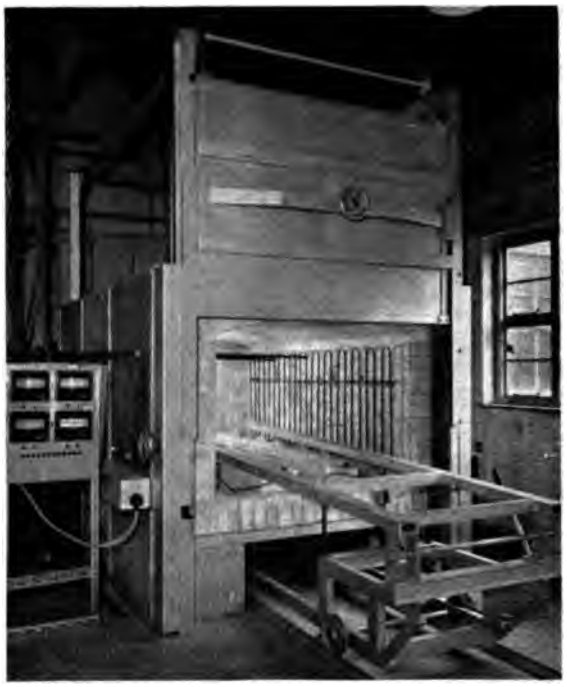

FIG. 1.—*Electric furnace, at Fulmer Research Institute, for firing vitreous-enamelled ware; it is used in connection with the research on vitreous-enamelling of aluminium tubes.*

Chatting with the staff in the foundry section revealed that the automatic spraying equipment developed at Fulmer for vitreous enamelling of aluminium—and in fact the whole project—was carried out for a single sponsor, and concerned the internal coating of formed tubes. An interesting sidelight was the development of a spark technique for detecting pinhole porosity in vitreous enamels. The research had resulted in techniques of enamel application which produced deposits that were completely free from pinhole porosity—the result, it was said, of scrupulous attention to initial metal cleanliness, and the setting up of rigorously controlled procedures to ensure that condition.

Although this building was designated "The Foundry," it held very little resemblance either externally or internally with the general conception held by readers of this JOURNAL. True, there was melting and casting equipment, crucibles and furnaces, but the plethora of vacuum and control devices and ancillary equipment present really converted it into something more akin to a foundry technologist's dream environment.

The list of sponsors of projects at Fulmer includes a number of well-known foundries, and published literature indicates an impressive list of successful achievements in the researches undertaken. Computation of charges is based on the time that staff are engaged on a project, plus materials at cost, and "overheads" at 110 per cent of salaries and wages. The published list of typical charges for routine work ranges from £1 1s. per element for chemical analysis to £500 per annum for the exclusive use of one high-accuracy creep-testing machine.

Prototypes from Polystyrene Patterns

Development time for design and alloy selection of investment castings is claimed to be reduced by a technique used by Precision Metal-smiths Incorporated, of Cleveland, Ohio. Metal prototypes of experimental or new parts are investment-cast from patterns of polystyrene. A complex pattern may be formed by breaking it down to its several simple components; each being easily machined from polystyrene, and then assembled with plastic adhesive to the desired design. This technique allows of experimentation with various designs for any given part, which can be cast in several alloys to select the one giving optimum service requirements.

Change of Design Made Easy

Often, several designs of a given part are required in order to determine what is the most functional casting possible. Radical design-changes are not easily effected in the machined-steel die which is normally used to produce patterns for investment castings. Fig. 1 shows an example of the production of an investment casting for prototype testing of a new part, without tooling. On the left are components of a prototype pattern made from easily-machined polystyrene. These parts may be assembled with plastic adhesive to form the complex pattern. On the right in Fig. 1 is a ferrous investment-casting made from this polystyrene pattern. Radical design-changes may be quickly and economically made merely by re-arranging the components of the pattern.

Fig. 2 shows machined polystyrene components of another prototype pattern. The bottom row (left) gives two views ((*a*) and (*b*)) of assembled plastic components forming two complete patterns. On the right (*c*) is a steel investment-casting made from a similar pattern. The components may be re-arranged in as many different designs as are required for testing of the cast parts. For instance, the four appendages could be placed around the outside diameter in unlimited positions by fastening them on with plastic adhesive. After the design has been accepted a die can then be made to produce patterns for production castings.

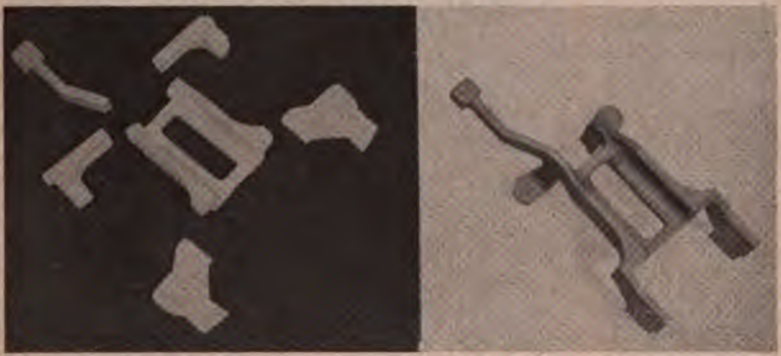

FIG. 1 —(*above*) *Components of a prototype pattern, made from polystyrene, and* (*right*) *a ferrous investment-casting made from the pattern.*

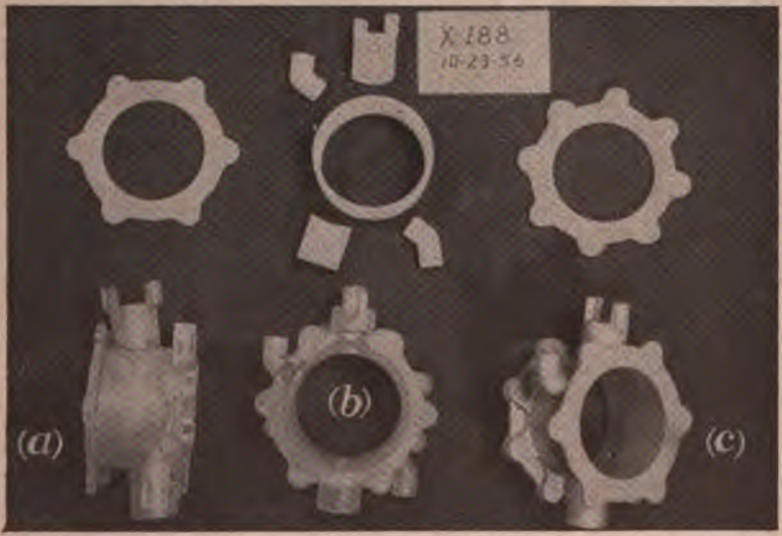

FIG. 2.—(*a*) *and* (*b*) *Two views of plastic components, and the completed pattern, and* (*c*) *a steel investment-casting made from such a pattern.*

tional Foundry Apprentices' Competition

ncourage foundry apprentices to take a pride in anship and to promote amongst them a greater dge of foundrywork is the objective of the an Foundry Apprentice Competitions, the first h was held in Stüttgart in 1957 and the second in 1958. The third competition is to be held t Britain in 1960, and with this in view the of British Foundrymen has undertaken to e a National Foundry Apprentices' Competition r, for the purpose of selecting suitable British itors for the international event.

he National Competition, competitors must not tained the age of 20 years on December 31; the will consist of a practical test in moulding and king which will last up to eight hours (this test rry more than half the total marks) and written hich will comprise: (1) Foundry technology (two (2) calculation (two hours) and (3) drawing hours). The latter tests will be held on Friday, ber 6, at appropriate local centres which will be d by branch Councils of the Institute. The al tests will be held in suitable regional centres national centre if numbers warrant it.

first step, a nomination form, copies of which een sent to all foundry mangements in the y (further copies can be obtained from the secre- the Institute) must be completed in respect of candidate. Nominees should normally have d a City and Guilds intermediate (now ary ") certificate in foundry practice or an equiva- ertificate, or have received suitable technical g. The written tests to be set in the National tition will be at a similar level to that anticipated European Competition.

considered that this National Competition can e greatest value in stimulating interest in foundry ticeship and in raising standards, and the an Competition which is to follow will provide ely valuable comparative information on the ds of training in this country and in the other ies of Europe. It is therefore urged that every r in a position to do so, should support the tition by nominating an apprentice on his staff , in his opinion, of the required standard. ould be carefully noted that completed nomina- orms should be sent to the secretary of the te of British Foundrymen at St. John Street ers, Deansgate, Manchester, 3, by October 10.

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eadquarters to Return to London

cision has been made to transfer the head office Institute of British Foundrymen to London and te of the transfer and the new address are d to be announced quite soon. Some readers emember that the Institute's headquarters was London in 1926, when it was moved to Man- following the appointment of Mr. Tom nson as the Institute's first full-time secretary. part-time secretaries were domiciled variously. rst secretary, Mr. F. W. Finch (1904-1907) lived oucester: Mr. J. E. H. Allbut (1907-1913) in iester; Mr. A. E. Pilkington (1913-1918) in rfield: Mr. A. Hayes (1918-1920) in London (Mr. was also Editor of the FOUNDRY TRADE JOURNAL) Mr. W. G. Hollinworth, who preceded Mr. nson was also a London man.

British and World Shipbuilding

Lloyd's Register Returns for June Quarter

Steamships and motorships under construction in Great Britain and Northern Ireland at the end of June totalled 280 ships of 2,033,745 tons gross; a decrease of 215,107 tons as compared with the previous quarter, states Lloyd's Register of shipbuilding returns relating to merchant ships of 100 tons gross and upwards. The total comprises 82 ships of 512,247 tons fitting out afloat, and 198 of 1,521,498 tons still to be launched. Some 58 ships of 189,431 tons were commenced; 69 ships of 363,581 tons launched, and 90 ships of 417,426 tons completed.

The vessels under construction included 52 steamships of 1,019,995 tons and 228 motorships of 1,013,750 tons. In other British Commonwealth countries there were under construction 9 steamships of 97,830 tons and 48 motorships of 126,832 tons. Oil tankers building in Great Britain and Northern Ireland totalled 64 ships of 995,688 tons, a decrease of 96,103 tons compared with an increase of 27,596 tons in the previous quarter, and representing 49.0 per cent. of the total tonnage under construction in this country.

Vessels building in the world, excluding China, East Germany, and Russia, numbered 1,452 of 9,739,036 tons compared with 1,511 of 10,001,761 tons in the previous quarter. The total included 245 steamers of 4,619,244 tons and 1,452 motorships of 5,119,792 tons. Construction in hand in the principal districts of Great Britain and Northern Ireland is indicated in Table 1.

TABLE 1.—*Shipbuilding Construction in Hand in Principal Districts of Great Britain and Northern Ireland.*

District.	June 30, 1959.		March 31, 1959.		June 30, 1958.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen ..	17	24,361	17	30,114	17	25,761
Barrow ..	2	67,500	2	67,500	3	94,000
Belfast	15	293,953	17	308,230	19	337,800
Bristol ..	1	3,500	2	4,850	3	6,200
Clyde:						
Glasgow ..	46	452,914	60	498,929	70	518,302
Greenock ..	23	143,520	24	164,296	29	158,810
Dundee.. ..	6	40,514	5	43,100	5	35,095
Hartlepool ..	3	25,710	4	28,200	7	53,640
Hull	38	12,461	38	15,176	36	17,267
Leith	8	32,326	10	44,319	11	61,657
Liverpool ..	12	111,638	12	111,678	12	106,202
Middlesbrough..	11	171,953	13	197,986	16	201,141
Newcastle-upon-Tyne ..	34	408,183	40	457,464	38	382,352
Southampton ..	7	11,064	9	8,717	9	3,669
Sunderland ..	24	215,489	25	245,244	31	268,380

The sizes of steamships and motorships (in parenthesis) under construction in Great Britain and Northern Ireland included the following:—100 to 500 tons, nil steam (94 motor); 500 to 1,000 tons, 3 steam (15), 1,000 to 2,000 tons, steam, nil (10); 2,000 to 4,000 tons, 3 steam (13); 4,000 to 6,000 tons, 2 steam (8); 6,000 to 8,000 tons, nil steam (18); 8,000 to 10,000 tons, 3 steam (29); 10,000 to 15,000 tons, 11 steam (36); 15,000 to 20,000 tons, 1 steam (1); 20,000 to 25,000 tons, 12 steam (4); 25,000 to 30,000 tons, 6 steam (nil); 30,000 to 40,000 tons, 8 steam (nil); 40,000 tons and above, 3 steam (nil).

There was under construction in the world at the end of June, 1,452 steamships and motorships of 9,739,036 tons gross, of which 20.88 per cent. is being built in Great Britain and Northern Ireland. The present total is 262,725 tons less than last quarter.

Of the steamships and motorships under construction throughout the world at the end of June, 5,310,184 tons (54.5 per cent.) are under survey by the Society for classification in Lloyd's Register Book.

Personal

Mr. L. Barrling has taken up the appointment of foundry manager with Fabrica De Aco Paulista S.A., Sao Paulo, Brazil.

Mr. J. Brennan, works manager of Carntyne Steel Castings Company, Limited, has been appointed a director of the company.

Mr. A. D. Lewis has relinquished his post with Henry Wallwork & Company, Limited, to join the staff of the National Foundry College, as a lecturer.

Mr. F. W. Percival has been promoted to the post of superintendent (ingot-mould foundry), with Guest Keen Iron & Steel Company, Limited, Dowlais, Glamorgan.

Mr. P. M. Williams has been appointed sales director of the Incandescent Heat Company, Limited, Birmingham, whilst retaining responsibility for the foundry-plant division.

Mr. R. C. Leppington has been appointed chairman of Hale & Hale (Tipton) Limited and subsidiary companies. Mr. J. A. Wylde has been appointed managing director of Hale & Hale (Tipton), Limited.

Griffin & George, laboratory furnishers, announce that Mr. Edward Bentley leaves Manchester, where he has been branch manager for two years, to take up the senior post of London branch manager.

Mr. K. Fearnside, 40, has been appointed to the board of Smiths Aircraft Instruments, Limited, as director of research. He was formerly research manager at the company's Cheltenham factory.

The British Cast Iron Research Association announce that Mr. I. C. H. Hughes, M.SC., A.I.M., has been appointed research manager, and that Mr. A. G. Fuller B.SC., has been awarded the M.S. degree of the University of London for his work on shrinkage and porosity.

To mark his retirement (on August 28) after nearly 64 years of service with the English Steel Corporation, Limited, Sheffield, 77-year-old Mr. F. Critchley was presented with a gold watch by Mr. T. R. Middleton, chief metallurgist and special director of the Corporation.

Sir Norman Hulbert, M.P., is to join the board of Dow Agrochemicals, Limited. The company is a British subsidiary of the Dow Chemical Company of America. It was formed in 1958 to manufacture and market agricultural chemicals in this country and its £1,000,000 factory is now under construction at King's Lynn, Norfolk

At a recent meeting of the board of Aluminium Laboratories, Limited, in Montreal, Dr. R. T. Parker was elected a director and vice-president of the company. Dr. Parker recently took charge of the Banbury and Geneva offices of the company in succession to Mr. R. D. Hamer. At the same meeting Dr. D. E. Thomas, head of the department of patents and contracts was appointed an assistant secretary.

Sir Alexander Fleck, chairman of Imperial Chemical Industries, Limited, will open the Scottish conference on "Relationships in Industry—Some Changing Concepts of Management" that is being organized jointly by the British Institute of Management and the Ministry of Labour. It will be held at Gleneagles Hotel, on October 23 and 24. Lord Monckton, chairman of the Midland Bank, will give the address at the closing dinner.

Mr. A. L. Ayton, F.C.I.S., a liveryman of the Worshipful Company of Fanmakers, has retired from his position as secretary of Keith Blackman, Limited, and the Blackman Export Company, Limited, nine days after celebrating his 50th year of service with Keith Blackman. He retains his seat on the board of directors of both companies. Mr. E. W. A. Richards, F.C.I.S., hitherto assistant secretary, has been appointed secretary of both companies, and Mr. A. W. Milborrow becomes chief accountant.

Mr. Maurice Tattersfield, has been elected to the board of the George Cohen 600 Group, Limited, following his appointment as financial controller of the group last year. His previous posts include those of director and secretary of Electro Hydraulics of Warrington, and of Conveyancer Fork Trucks, Limited; director of the Brush group of companies; and managing director of Brush Electrical Engineering, Limited. Mr. Tattersfield was at one time a Governor of Loughborough College of Technology.

The Minister of Supply has appointed Professor Michael J. Lighthill as Director of the Royal Aircraft Establishment, Farnborough, in succession to Sir George Gardner, who (as reported last week) has been appointed to succeed Air Chief Marshal Sir Claude Pelly as Controller of Aircraft at the Ministry in October. Professor Lighthill has been Beyer Professor of Applied Mathematics at the University of Manchester since 1950.

Obituary

Mr. Phillip Jenkins, a director of Robert Jenkins & Company, Limited, engineers, Wortley Road, Rotherham, has died at the age of 49.

Mr. W. H. Prevost, founder and managing director of W. H. Prevost & Son, Limited, agricultural engineers, of Yaxley and Broadway, Peterborough, has died at the age of 75.

Mr. Charles Joseph Rhodes, who died last week at the age of 84, was managing director of Joseph Rhodes & Sons, Limited, Grove Ironworks, Belle Vue, Wakefield, Yorks. The company was founded by his grandfather in 1924.

Mr. Frank A. Watson, a well-known figure in the light-castings industry in Scotland, has died at the age of 73. After training as a civil engineer, he joined the Larbert Art Metal Company, Limited, and in the early 1930s he took part in the establishment of the Scottish Enamelling Company, Limited, which was set up to exploit the processing of vitreous enamelling. He retired from the latter company, but retained his connection with the Larbert Art Metal Company.

Col. W. R. Glover died on August 25 at the age of 77. He was honorary president of Glover & Main, Limited, London, S.W.1, and had given 60 years' continuous service to the gas industry. He retired as chairman of the company last February. Col. Glover was a grandson of the founder of Thos. Glover & Company, Limited, gas-meter manufacturers and repairers, and he joined the company in 1900 as an apprentice under his uncle, the late Mr. J. G. Glover. Upon completion of his apprenticeship in 1905 he became manager of the company's Birmingham branch and was appointed a director in 1910. In 1919, following distinguished service with the Royal Fusiliers in the 1914-18 war, he was appointed managing director of Thos. Glover & Company, and in 1949 was appointed chairman of the Glover & Main group.

Apologies are made for the fact that in announcing the death of Mr. H. J. Roe in last week's "Obituary" his name was incorrectly spelled as Rowe.

News in Brief

British Productivity Council will, as from next year, assume the responsibility for the ion of *Target* hitherto handled by the Central f Information.

.500,000 **bus contract** has been placed with Motors, Limited, and Metropolitan-Cammell- nn, Limited, by the Cuban company of Omni- tropolitanos S.A.

the cooling system at the works of the de Foundry & Engineering Company, Limited, ld, Sheffield, failed recently, a fire engine was pump 7,000 gall. of water into the works.

perties of Cast Iron at Elevated Tempera- (ASTM Special Technical Publication No. hich was reviewed in last week's Journal, p. be obtained in this country through Penton ing Company, Limited, price 35s.

c, **Limited**, announce the establishment of a d-area sales office at the company's main s in Tyburn Road, Birmingham 24. The r of the new office is Mr. H. J. **Podmore** ined Birlec in 1955 as sales manager, dryer plant division.

J. **Little** of the trackwork department of Allen & Company, Limited, Sheffield, has left rgapur, India. He is to supervise the laying of rk supplied by Edgar Allen in conjunction orman Long & Company, Limited, for the shops of the new steel plant.

rd Hill Limited, Middlesbrough, a member of th Cleveland group specializing in the design orced concrete structures and in the manufacture orcement, announce the setting up of a design the West Indies at 39 Half Way Tree Road, n, Jamaica. Mr. A. J. Benghiat, B.SC., has been ed manager of the office.

he Journal of August 20, when reporting the ment of Mr. K. E. Walker as a director of F.C. ction Company, the firm were described as nders. This is incorrect, the firm are engineers contractors in ferro-concrete construction, zing in gas-works plant. Apologies are made who were confused by the error.

owing a change in production patterns, with npany's products having a lower casting content efore, Baker Perkins, Limited, engineers, West- Works, Peterborough, have discharged 25 s in their foundry, including skilled, semi- and unskilled men. It is anticipated that all naining foundry workers will be needed.

Borough Polytechnic, Borough Road, London, in collaboration with the education committee Institute of Metal Finishing, has arranged a of six lectures on plating-shop management and . They will be given on Tuesday evenings, ncing October 6, at 7 p.m. Details are avail- om Mr. Fredk. J. Packer, F.C.I.S., at the above .

ng a fire which lasted 50 minutes at Clay ronworks, Derbys., on August 22, two 60-ft.-tall wooden cooling towers, which were being shed, were completely destroyed. Colonel Jackson, joint managing director of the com- aid that there was no serious damage to other f the plant and production would not be ed with.

The Co-operative Wholesale Society, Limited, Manchester, as part of its rationalization policy, is to close down its ironworks at Keighley, Yorkshire. This decision follows the closure of the foundry two years ago. Employees of over 60 will be allowed to retire on full pensions before the normal retiring age of 65, and others will receive *ex gratia* payments up to a limit of 10 weeks' salary.

A £2,000,000 **contract** for the supply of a sugar factory to Iran by the John Brown Construction firm will be shared by the Paisley engineering firm of A. F. Craig & Company, Limited. The two companies are to provide processing equipment to deal with 1,000 tons of sugar-beet per day. The factory, ordered by the Sherkat Shami Ghandi Pars Company, is expected to be completed by 1961.

Quasi-Arc, Limited, of Bilston, Staffs, have announced their intention of reducing the price of arc-welding electrodes, as the company proposes to pass on the benefits of recent reductions in the price of hot-rolled mild-steel rods—the basic material for manufacturers drawing their own wire. The new price reductions will apply to all deliveries of mild-steel electrodes made on and after October 1.

G. C. Ogle & Sons, Limited, agricultural implement manufacturers, Ripley, Derbyshire, is to close its foundry. Mr. Humphrey Ogle, the works manager, has said in a statement, that it is no longer economical for the firm to do its own casting because of recent changes in production. Steel fabrication is being increasingly used and the work will be handled by an outside firm. G. C. Ogle expect to find their foundry workers alternative employment in the firm.

An International Film Festival is to be held in Oxford from September 23 to October 2. It is the 13th Congress of the International Scientific Film Association at which representatives of documentary and scientific film organizations from 25 countries will be taking part. During the ten-day Congress the delegates will see more than 100 films from overseas. The rapid growth of the International Scientific Film Association which was founded in 1947, reflects the increasing importance of the work. It now has a membership of 30 nations many of them being the Eastern European lands—also Japan.

Important changes in factory law have been introduced by the Factories Act 1959. Mr. Harry Samuels, O.B.E., M.A., barrister-at-law, will explain what these changes mean in practical terms at a meeting for industrial executives arranged by the Industrial Welfare Society. The meeting, which will be held at the IWS headquarters, Robert Hyde House, 48, Bryanston Square, London, W.1, is open to non-members. It takes place at 2.30 p.m. on September 16. The fee for the meeting is £2 2s. for delegates from IWS member organizations and £2 10s. for those from non-members.

A **convention on social security** between the United Kingdom and Denmark was signed in London last week. Mr. Julius Bomholt, the Danish Minister for Social Affairs, came to this country for the signing of the convention on Tuesday of last week, and other signatories were Mr. Birger Ove Kronmann, Charge d'Affairs at the Danish Embassy; Mr. Selwyn Lloyd, Foreign Secretary; and Mr. John Boyd-Carpenter, Minister of Pensions and National Insurance. Mr. Ivan Neill, Minister of Labour and National Insurance for Northern Ireland, was also present. Mr. Bomholt returned to Denmark on Friday last.

News in Brief

TWO BLOWING ENGINES, made in 1851 by Murdoch and Aitken, are awaiting their fate at the Lilleshall Company, Limited, Oakingates, Shrops., where the blast furnace was recently closed down. The engines are highly ornamental with Doric columns and elaborate decorations, and are known as Sampson and David. Mr. C. R. Nicholls, secretary and director of the company, said that the firm had been in touch with the Newcomen Society and with the Ministry of Works with regard to the preservation of the engines for their historical interest. He added that unless a decision were reached quickly the two veterans would have to go for scrap.

TUBE INVESTMENTS SUBSIDIARY COMPANY, Brookes (Oldbury), Limited, has received an order from V/O Stankoimport, Moscow, USSR, for two double internal-tube polishing machines complete with dust-extraction equipment and necessary ancillary equipment. The value of the orders is over £30,000. The machines are for the internal polishing to mirror finish of stainless-steel tubes as used in the dairy, brewing and food industries. They polish two tubes simultaneously up to 40 ft. long. Earlier in the year, the steel-tube division of Tube Investments received Russian orders for stainless and alloy-steel tubes valued in excess of £2,000,000.

THE LICENSEES IN JAPAN of the Power-Gas Corporation, Limited, Stockton-on-Tees, Mitsubishi Chemical Machinery Manufacturing Company, Limited, of Tokyo, have received an order for one unit of carburetted water gas plant, with a capacity of 2,000,000 cub. ft. per day, for the Saibu Gas Company. Earlier this year the Power-Gas Corporation (Australasia) Pty., Limited—an overseas member of the Power-Gas group of companies—received an order for one unit of c.w.c. plant with a normal capacity of 9,000,000 cub. ft. per day and with a peak load capacity of 12,000,000 cub. ft. per day. This plant is to be installed at the Mortlake Works, Sydney, of the Australian Gas Light Company.

THE VALUE of industrial and commercial firms having works fire brigades was stressed by Chief Fire Officer B. Jones, head of Sheffield Fire Brigade and president of the Yorkshire Industrial Fire Brigades' Association, in a foreword to the programme for the fire brigade competitions held at the sports ground of Brown Bayley Steels, Limited, Olivers Mount, Darnall, Sheffield, on August 29. He stated that the brigades were useful not only for the extinguishing of fires but also for the knowledge the men had of the causes of fires in works, and the removal of them. Constant vigilance and practice was necessary, he said, and added that it was good to see that many managements realized the value of having a works fire brigade.

Mr. G. Y. MANGRULKER, head of the staff-training centre of the Tata Iron and Steel Company, Limited, Jamshedpur, India, is to visit Britain for a six-week study tour arranged by the Industrial Welfare Society. The objective of the visit, which will run from September 16 to November 2, is to examine a variety of staff training centres and to discuss with British experts the current trends in training practice. Among others, Mr. Mangrulker will visit the staff residential course of the United Steel Company, Limited, the staff college of Richard Thomas & Baldwins, Limited, and the management college of the British Iron and Steel Federation. Tata's staff-training centre has been in existence for about four years, and the company now intends to extend the work of the centre to include management development.

Scottish Industries Exhibition

A British Railways station has been renamed to commemorate the 1959 Scottish Industries Exhibition which is being held from September 3 to 19 in the Kelvin Hall, Glasgow—Partick Central Station, which is about half a mile from the Exhibition site, is now known as "Kelvin Hall" station. (The number and avenue in brackets alongside the firm's name is the stand number and location.) Stands of special interest to readers include:

KELVIN & HUGHES, LIMITED (*15, Kelvin Avenue*) are exhibiting a simulator unit of an automatic boiler-control installation, and examples from their range of ultrasonic flaw-detection equipment.

STEWARTS AND LLOYDS, LIMITED (*15, Hunterston Avenue*) are displaying steel tubular products, and a selection of steel castings with supporting photographs.

ELECTRIC RESISTANCE FURNACE COMPANY, LIMITED, are showing furnaces in operation for the bright-hardening of small parts, and a model of a new-type furnace incorporating a closed quench. This new furnace is a vertical cylindrical atmosphere furnace, combining the advantages of pit-gear gas carburizers with facilities for closed quenching hitherto available only in horizontal equipments.

KEITH BLACKMAN, LIMITED (*24, Grange Avenue*). Exhibits of particular interest are: the recently introduced "Aristocrat" centrifugal fan for general applications; 19-in. axial fan for general industrial and marine ventilation purposes, and a two-stage, 20-in. cast-iron blower.

G. & J. WEIR, LIMITED (*4, Clyde Avenue*) show three entirely new marine units: a diesel starting air compressor, a vertical marine evaporator with built-in distilling condenser, and a single-stage, turbine-driven boiler-feed pump which runs at 10,000 r.p.m.

* * *

Trade Drive

The Scottish Industries Exhibition, which Princess Margaret opens to-day (Thursday) in Glasgow, is to be followed by an intensive drive for trade in territories as dissimilar as the Soviet Union and North America. So far the Scottish Council (Development & Industry), who resolved in principle in June to sponsor a mission to Russia, have been approached by seven different companies and trading groups who are genuinely interested in that project. The question of how it should be organized is now being discussed with the Board of Trade.

An association of the Robinson family with the Staveley Iron & Chemical Company, Limited, Chesterfield, lasting since 1810, has ended with the retirement of Mr. CHARLES W. ROBINSON, a technician in the works foundry department. He started as an apprentice with Markham & Company, Limited, constructional engineers, Chesterfield, and then went to the Staveley Works where he had completed 38 years in the foundry department on retirement. His grandfather became the first secretary of the company in 1863, after members of the family had already served for over 50 years with the firm. The father of Mr. Charles Robinson worked in the patternshop for many years.

Raw Material Markets

Iron and Steel

' of foundry pig-iron in all grades is available;
appreciable stocks are still being held by the
, mainly hematite, low- and high-phosphorus,
refined-iron makers would also appreciate
al business. The motor foundries and the
:s specializing in castings for this industry are
ployed and are calling for considerable quan-
low-phosphorus iron, hematite, and refined pig.
·neral engineering foundries, including the
-tool makers, are busier than they have been
re again, their requirements are largely for
·, low-phosphorus, and refined iron.

omewhat improved position in the light found-
textile engineering foundries is maintained, but
them could easily take on additional business.
ındries are confining their purchases to small
:s to cover their early requirements.

ɔn makers are interested in export inquiries,
ıany cases their prices are higher than those of
tinental producers.

supplies for the foundries are coming through
ule. No difficulty has been experienced either in
or South Wales in meeting current needs and
:s find it unnecessary to carry heavy stocks
deliveries are usually quite prompt.

has been a considerable change at the re-
luring the last two months or so. Business has
d considerably for light sections, small bars,
ɪ re-rollers are once again placing appreciable
to cover their requirements for the next two
months; such orders cover a tonnage for stock,
·ves were run down to a low level while trade
or. Makers of billets are well covered until
· and some even beyond this period. There is
improved demand for seconds and short billets
for the re-rolling industry.

Non-ferrous Metals

strike position in the United States continues
ıinate copper markets throughout the world.
ndon market after earlier weakness is showing
f strength. The revival set in towards the end
week when rumours circulated of a difficult
situation brewing up at the Braden copper
ı Chile. New York also hardened on this
ıtion and the change in attitude so induced
pt going by the feeling that the present strike
US may last a long time. This latter feeling
new. Indeed, there have been many inquiries
London and continental exchanges for copper
pment to the US, but actual buying has been
than had been expected. It now transpires
: one reason of substance overlooked on this
the Atlantic has been the threatened strike of
ın longshoreman. The threatened longshore-
trike is due to begin on October 1 and
of it all available freight space has been
in advance. This, coupled with the fear that
›ments could be landed after this time, even
ıt space were available, has held demand down
low what could have been reasonably expected.

ıese circumstances the US price structure has
:d unchanged, with both custom smelters and
' producers quoting 30 cents a pound. In
: the price has firmed up several points due to
ɔve features and also to the reappearance in
rket of Russian buyers. How long this will
e is impossible to say. If past experience can be relied upon, it will cut off suddenly without warning in a very short time.

The proposal put forward last week by the European Mineworkers that the Rhodesian copper mines should be nationalized has not had much of a reception. Quite aside from it being shrugged off in the market in London, it now seems that there is disagreement on this proposal within the Union. In any event, it would be interesting to know how the proposal could be implemented in practice without resorting to the worst kind of expropriation procedure as the finance required for such an operation may be gathered when it is known that Nchanga alone is valued in the market at approximately £87,000,000.

Tin is a quiet market and without feature. This is mainly due to the United States steel strike, which has hampered American buying for some time. It is, however, also due to the fact that the International Tin Council meeting, which opened in London on Tuesday, has been overhanging the market, which always prefers to wait and see. The US price is fluctuating narrowly around $1.03 a pound.

Lead is dull, and even the threatened strike at Bunker Hill failed to stir the market. Nevertheless, the volume of trading is satisfactory in London and the price is holding its own on both sides of the Atlantic. In the US the quotation is 13 cents a pound. Zinc continues to be routinely satisfactory. Turnover has tended to fluctuate in accordance with the market for copper in London. The market is steady in the US, where the price is called 11 cents, East St. Louis.

Latin American Business Prospects

Mr. W. T. Hale of Thomas Marshall & Company (Loxley), Limited, Sheffield, on his return recently from a visit to South America, held a Press conference at the Wig and Pen Club in Fleet Street, London, E.C.4. Last year his firm received export orders to the value of £45,000 for blast-furnace linings in the face of severe international competition. This company has successfully lined no fewer than 165 blast furnaces and heartened by the receipt of additional orders, Mr. Hale went to South America to investigate the market for refractories in Brazil and Chile. At the Press conference, he stated that it would be possible to secure orders in those areas for UK plant and equipment, only until such time as the same items could be manufactured locally. He also expressed the opinion that, so far as his firm was concerned, British credit facilities were inadequate, and better conditions were being offered by Japan and Western Germany to their exporters. The Editor of the JOURNAL is not too sure that Mr. Hale is correct, as in reviewing the whole picture of exports, it may be that money can be lent with greater safety in other markets.

"Dip. Tech." Awards

The second list of awards of diplomas in technology has been issued by the Board of Education: all the candidates studied at Battersea College of Technology. First-class honours in engineering were gained by P. W. Lightfoot and D. J. Pollard; second, by A. E. Freeman, and a pass by B. C. Rogers. In metallurgy, firsts were gained by K. Bolton and B. L. Eyre, and second-class honours by A. L. Greenwood and W, H. Hodgson. There are now 2,500 students taking courses leading to the diploma, an award equal in standing to a university honours degree.

Current Prices of Iron, Steel, and Non-ferrous Met

(Delivered unless otherwise stated)

September 2, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 6-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 6-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 11s. 6d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 6-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 10d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 10d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons. £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cen £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship p (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E C £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. C £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under and flats 5 in. wide and under, untested soft basic, 50 and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, 100 tons and over, £38 0s. 0d.; uncoated strip mill coil rolled, under 3mm. to 12g., 25 tons to under 50 £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 ton over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. nickel-chrome, £99 4s. 0d.; nickel-chrome-molybde £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £237 0s. 0d. to £237 5s. 0d.; t months, £234 15s. 0d. to £235 0s. 0d.; settlen £237 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3¼d. per rods, 251s. 0d. per cwt. basis; 20 s.w.g., 286s. 0d. per

Tin.—Cash, £792 0s. 0d. to £792 10s. 0d.; three mon £792 0s. 0d. to £792 10s. 0d.; settlement, £792 10s. 0d.

Lead (Refined Pig).—First half September, £71 10s. to £71 15s. 0d.; first half December, £73 2s. 6d. £73 5s. 0d.

Zinc.—First half September, £86 0s. 0d. to £86 10s. First half December, £85 0s. 0d. to £85 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all Eng destinations, £121 15s. 0d.; rolled zinc (boiler plates), English destinations, £119 10s. 0d.; zinc oxide (Red S d/d buyers' premises, £101 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10⅝d. per sheets to 10 w.g., 202s. 6d. per cwt.; wire, 2s. 8¼d.; ro metal, 202s. 6d. per cwt.

Brass (Brazing).—BS1400, B3, £156; B6, £200.

Brass (High Tensile).—BS1400, HTB1, £185; HT £202; HTB3, £214.

Gunmetal.—BS1400, LG2, £193; LG3, £203; G1, £263; G1, 1%, £242.

Phosphor Bronze.—BS1400, PB1 (AID released), £ BS1400: 90/10/1, £266.

Leaded Phosphor Bronze.—BS1400, LPB1, £213.

Phosphor Bronze Strip, etc.—Strip, 290s. 9d. per c wire, 4s. 1⅛d. per lb.; rods, 3s. 5d.; tubes, 3s. 5d.; c cast bars: solids 3s. 4d.; cored 3s. 5d. (Charles Cliffo Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide 0.056, 3s. 10¼d. per lb.; round wire, 10g. in coils (10 cent.), 4s. 3¼d.; special quality turning rod, 10 per ce ½ in. dia., in straight lengths, 4s. 2¼d. All prices are ne

Other Metals.—Magnesium, ingots, 2s. 3d. per Antimony, English, 99 per cent., £190 0s. 0d. Quicksil ex-warehouse, £71 10s. 0d. Nickel, £600 0s. 0d. Alumini ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £ AB2, £247.

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* Average 68–70 per cent.

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American Letter

Ford's New Light-castings Industry

Industrial Heating is an American technical journal, and a recent issue carried an illustrated description of the Ford Motor Company's new engine and foundry division plant in Sheffield, Alabama. It is outstanding inasmuch as it brings molten aluminium from the nearby Reynolds Metal Company, which smelts this metal from alumina. The metal leaves the smelter at a temperature of 925 deg. C. to fill 4½-ton ladles, having been alloyed to Ford's specification. These ladles are hauled—two on a flat-bed trailer—over a private road to the nearby Ford plant, when the temperature will be of the order of 850 deg. C. In the foundry building there are 14 Lindberg reverberatory furnaces which, using a 15-ton overhead crane, are filled from the ladles through the spout. Eight of these furnaces have a capacity of 29 tons and are used for holding the metal at the desired temperatures. Natural gas is the main fuel used, but light fuel-oil is used as a standby. The other six furnaces have a capacity of about 9 tons, and four of them are used for remelting scrap. One of these is very interesting, as it is used for castings containing steel inserts. Thus it is provided with a sloping hearth, which allows the molten aluminium to drain away leaving the steel components high and dry and easily raked out of the furnace.

Quality Control

Quality control starts with the careful charging of the holding furnaces, which assures a minimum of dross formation. Chlorine gas is piped directly to each of the furnaces and the bath, after fluxing and skimming, is allowed to stand for a fixed period before sampling. It sometimes happens that a second treatment is required in order to comply with the specification, and no metal is released without being approved and the details recorded. The molten metal is discharged through a tap-out block into a cab-mounted 1-ton capacity transfer-ladle, monorail suspended. When the ladle is filled, a 2-lb. solid-flux degassing tablet is introduced and submerged using an inverted steel bell, after which resampling takes place. If this is satisfactory the ladle goes to the casting area. Here there are Lindberg-Fisher electric resistance reverberatory-type holding furnaces either of 12- or 18-cwt. capacity. At this point the metal is often flushed with bottled nitrogen as an assurance against porosity. Much of the production goes to feed both gravity- and pressure-die casting machines, making castings weighing up to 30 lb.

Copper in Cast-iron*

Copper in cast-iron has practically no direct effect on the properties of the graphite phase. It is not a carbide-forming element, and only a few copper atoms can be dissolved in cementite, the physical properties of which thus remain practically unaffected. At the solidification stage copper is a mild graphitizer (this effect is well known)—its graphitizing effect is estimated as being between one third and one fifth that of silicon. According to the author's experience, it is a milder graphitizer than nickel. Copper also has a dendrite structural refining effect. The effect of copper as a refiner is difficult to estimate in the case of flake graphite. The refining effect on cementite and graphite is due to a retarding influence of copper on the carbon diffusion rate. Smaller individual crystals mean a larger number.

The anti-ferritizing power of copper, compared with nickel and with tin, showed that nickel additions up to 6.4 per cent. resulted in an acicular structure, but did not completely eliminate the ferritic "bulls-eyes' in s.-g. iron. However, additions of copper at 0.8 per cent. were sufficient to eliminate the bulls-eyes and give a fully pearlitic matrix. Thus, it appears that copper is a powerful anti-ferritizer. In the same series of experiments, a fully pearlitic matrix was obtained with a 0.06-per cent. tin addition, resulting in a 0.03-per cent. residual tin content. The anti-ferritizing effect of copper, tin and other elements is not limited to s.-g. iron, but flake graphite irons need larger amounts of anti-ferritizing additions because of the much larger graphite/austenite interface surface. The anti-ferritizing effect of copper has long been known, but it has been set out in the wrong way and generally misunderstood. Indeed, in many technical papers it is said that copper is a pearlite stabilizer, which statement is fundamentally wrong. However, it is correct to say that copper is a pearlite-formation promoter.

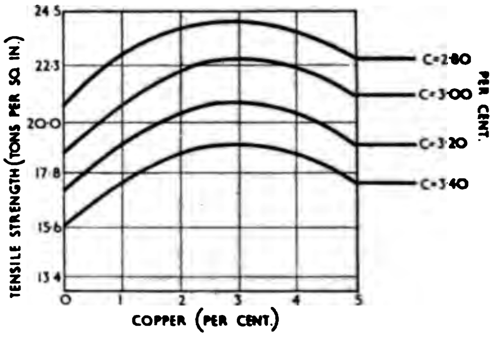

FIG. 1.—*Graph showing tensile strength according to copper content in cast-iron for different amounts of carbon (¾-in. dia. test-bar as-cast; Si*—1.8 *to* 2.0; *Mn*—0.50, *and P*<0.10 *per cent.*).

Copper is also an austenite stabilizer. As the ferritizing reaction proceeds, copper must concentrate in austenite, in a similar manner to that in which (for an analogous reason) silicon concentrates in ferrite. Thus, increased copper concentration in austenite corresponds to increased austenite stability, and consequently to a lower reaction-rate. However, the retarding effect based only on austenite stabilization is probably unimportant, since nickel has an equal or even higher austenite-stabilizing effect but does not substantially retard direct ferritization.

Recent experiments on a TC 3.20, Si 1.50 per cent. cast-iron (melted in a high-frequency furnace and cast into 1¼-in. and ⅝-in. dia. test-bars) reaffirmed the quantitative influence of copper additions to grey cast-iron. The hardness and strength values increased as shown in Fig. 1. and the impact strength decreased moderately with increasing copper contents. It seems that copper is a graphitizer at the solidification stage, as well as an anti-ferritizer through the transformation cooling-range, and that a more uniform structure (having good overall strength and hardness properties) may be imparted to grey iron by copper additions.

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* Synopsis of a paper, by Albert de Sy (head of metallurgy department, University of Ghent, Belgium), presented at the AFS Congress in Chicago, in April.

Farnborough Exhibition

The Society of British Aircraft Constructors' Flying Display and Exhibition will be held as usual at Farnborough this year, from September 7 to 13. Some of the stands which will be of major interest to foundrymen are briefly reviewed below (the figure in brackets after the firm's name is the stand number).

SOLARTRON ELECTRONIC GROUP will demonstrate some of their newest developments in all-electronic simulator systems.

TALBOT STEAD TUBE COMPANY, LIMITED (*211*), will show stainless heat-resisting seamless, welded, and welded and drawn, steel tube in both straight and manipulated forms.

NORTHERN ALUMINIUM COMPANY, LIMITED (*131*). The chief exhibit will be a wing skin panel, 23 ft. long and 23 in. wide, machined from plate in Noral B26S WP alloy (DTD5020) for Vickers Vanguard. A range of intricate aircraft castings will also be displayed.

ENGLISH STEEL CORPORATION, LIMITED (*273*). Four wholly-owned subsidiary companies combine together on one stand to show an interesting group of items selected from the wide range of products which they manufacture for the aircraft industry.

SIMMONDS AEROCESSORIES, LIMITED, and FIRTH CLEVELAND INSTRUMENTS, LIMITED (*188*). An aircraft fuel-dispensing unit, an entirely new range of lightweight all-metal stiffnuts, and a miniature barograph are amongst the new products displayed.

MOND NICKEL COMPANY, LIMITED (*171*). A full range of technical publications dealing with the use of nickel-containing materials in modern industry, with particular reference to the aeronautical field, will be available. In addition, the stand will be staffed by members of the Company's development and research department, who will answer technical enquiries.

MANCHESTER OIL REFINERY (SALES), LIMITED (*89*), will be demonstrating the uses of M.O.R. inks for the non-destructive flaw detection of aircraft components. The first group of inks utilizes the magnetic-particle method of testing, and the second demonstrates the penetrant-testing of magnetizable and non-magnetizable articles.

SAMUEL FOX AND COMPANY, LIMITED, and STEEL PEECH AND TOZER, LIMITED (*132* and *133*), are to stage a joint exhibition. Exhibits will include a jet-engine combustion chamber, and a display of rolled-steel rigs used in gas-turbine engines.

DESOUTTER BROTHERS, LIMITED, will be exhibiting four new portable pneumatic power tools, a reversible screwdriver, a corner screwdriver and nutrunner, a new grinder, and a reversible corner nutrunner.

SMITHS AVIATION DIVISION (*1* to *4*). Central feature of the stand will be a pictorial display of the "Autoland" automatic landing system. Also to be seen for the first time will be the new type-4 Smiths Flight System, thermocouples and harnesses featuring compacting techniques, a new miniature relay and the new A.R.B.-approved civil altimeters.

ALBRIGHT & WILSON (MFG.), LIMITED (*123*). A wide range of Kanigen-plated components will be shown. Kanigen is a new nickel-phosphorous plate deposited by chemical reduction which can be applied to all ferrous metals, aluminium, titanium, copper and brass.

HENRY WIGGIN AND COMPANY, LIMITED (*17*). The theme of this stand will be the progress made in the development of the Nimonic series of alloys.

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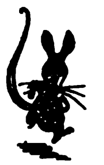

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Company News

Willenhall Motor Radiator Company, Limited—The interim for 1959 is raised from the equivalent of 3¾ per cent. to 5 per cent. on capital doubled by a scrip issue. A total equivalent to 15 per cent. was paid for 1958.

International Combustion (Holdings), Limited—An interim dividend of 10 per cent. compares with a corresponding payment of 7½ per cent. The dividend has been increased solely with a view to reducing the differential between the interim and final dividends.

Hartley & Sugden, Limited, boilermakers, etc., of Halifax--The offer by F. Francis & Sons (Holdings), Limited, manufacturers of metal containers, etc., of London, S.E.13, to acquire the company's capital has become unconditional and the acceptance date was extended to September 1.

B. Elliott & Company, Limited, machine-tool makers, of London, N.W.10—The sharp reduction in profits forecast in the interim review, was due to the substantial reduction in turnover which resulted from the low level of demand for standard machine tools, and the closing of the South Wales factory. Orders over the past few months, however, have shown a substantial increase. Group trading profits fell sharply to £201,345 (£379,515) in the year ended March 31, 1959, and the dividend is reduced to 17½ (30) per cent. with a 10 (22½) per cent. final.

Walker Bros., Limited, constructional engineers and sheet-metal workers, etc., of Walsall (Staffs)—At the present stage the company is well on its way to equalling the figures for the year ended March 31, 1959, and, states the chairman, Mr. T. A. W. Allen, they could be even better. It is not expected that the parent company will have a particularly good year, but the period opened very well for Benford, Limited. Group profits, before tax, at £256,750, were 28 per cent. up on the previous year, and an equivalent dividend of 30 (17½) per cent. is being paid.

Engineering Components, Limited—Sales during the first six months of 1959 show an increase over the corresponding 1958 period, production increased steadily, and order-books reflect the general increase in activity, according to the chairman, Mr. C. C. Griffith. He adds that this tendency should continue. Profit, before tax, for the six months amounted to £240,000 and in order to reduce the disparity between interim and final payments the directors have doubled the interim dividend at 5 per cent., but they emphasize that this does not indicate a higher total for the year. Final for 1958 was 12½ per cent.

Albright & Wilson, Limited, holding company for manufacturers of industrial chemicals –The company is raising its interim dividend from 4 per cent. to 6 per cent. on the £5,704,519 ordinary in respect of 1959, and proposes a one-for-four scrip issue. The directors emphasize that both the increase in dividend and the issue are intended as technical adjustments, the first to make the interim a higher proportion of the total distribution, and the second to reduce the disparity between issued capital and total shareholders' funds employed. Neither individually nor taken together should the adjustments be considered to imply in themselves an increase in the total distribution. The scrip issue is applicable to holders of September 4. Group net profit in the six months to June 30, 1959, rose to £1,122,000 from £793,000 in the corresponding period of 1958. Present indications are that profits for the remainder of 1959 may be slightly lower than those reported for the first half-year.

American Nickel Stockpile

The General Services Administration announced in Washington on August 26 that under agreements reached with the International Nickel Company of Canada, Limited, the Government will be relieved of all existing obligations to purchase nickel from the company for the Government stockpile. Under the agreements, Inco has agreed to cancel all remaining deliveries of nickel under the company's "market price" contract.

Inco has also agreed that the nickel remaining deliverable under the company's "premium price" contract for the production of nickel from high cost marginal ores will be diverted into the market instead of being delivered to the Government. The Government in turn will pay the company for difference between the market price and the contract price under the "premium price" contracts—payment to be made in Government-owned nickel oxide sinter, which is in excess supply.

Monsanto Chemicals Improvement

Increase in the half-year's net sales and income, compared with the corresponding 1958 period, of Monsanto Chemicals, Limited, is an encouraging indication of both greater demand for and output of products, states Sir Miles Thomas, chairman. Results were mainly due to increased business done and improved efficiency in the manufacture of previously established products. Export sales accounted for 37 per cent. of trade.

Net sales rose to £8,726,720 (£7,489,848) and income for the six months to £371,611 (£247,642), after charging estimated taxes of £348,400 (£284,100). The figures relate to the company and its UK subsidiaries only and do not include earnings of the Australian subsidiary.

A maintained interim of 5 per cent. is declared on the £5,400,000 ordinary capital. The previous year's total was 13½ per cent.

George Kent Rights Issue

A rights issue to ordinary stockholders of 540,000 10s. ordinary shares at 30s. a share in the ratio of three new shares for every eight 10s. stock units held is to be made by George Kent, Limited, industrial instruments and automatic control manufacturers, of Luton (Beds).

Net proceeds are estimated at £791,500 and will be applied in repaying the bank overdraft which at August 12 was £561,912, in financing capital expenditure already approved, and in providing additional working capital to finance anticipated increased sales of the instrument division.

The new shares will not rank for the final dividend for the year to April 4 last. Current year profits are expected to be at least up to last year's level and the directors are confident they will be able to maintain the ordinary dividend at 17 per cent. on the increased capital.

Imperial Aluminium Company, Limited—The board of this company, which has been formed to link Imperial Chemical Industries, Limited, with the Aluminum Company of America in the manufacture of wrought aluminium products, has been constituted as follows:—From ICI: Dr. James Taylor (chairman); Mr. Berkeley Villiers (managing director); and Mr. Michael Clapham. From Alcoa: Mr. DuBose Avery and Mr. F. J. Resch.

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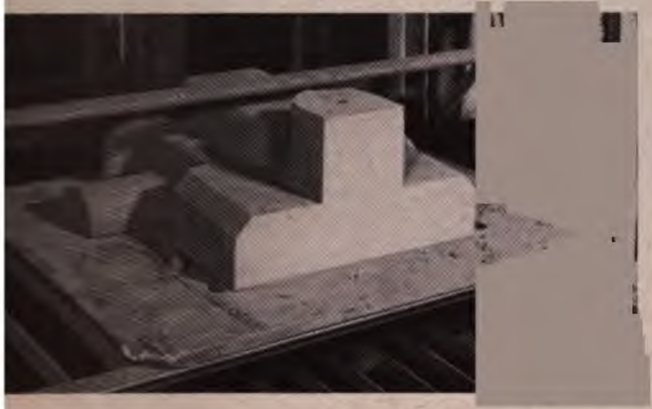

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Book Review

Creep of Engineering Materials, by Iain Finnie and William R. Heller. Published by McGraw Hill Publishing Company, Limited, 95, Farringdon Street, London, E.C.4; price 89s.

The authors of this excellent book have both been teachers in educational institutions in the USA and are now with the Shell Development Company. They point out that "Metallurgical design against creep was a general reality" soon after oil-cracking equipment was developed and they complain "that theoretical understanding of alloying effects and plastic flow in metals has still not caught up with practical advances." The one is an "engineer" and the other a physicist, but chapter 5 on the "Creep Behaviour of Specific Metals" shows that the metallurgical content of the book is good.

The properties of various steels are outlined, and "super" alloys, and alloys with aluminium, magnesium, copper, titanium and zirconium bases are reviewed. The influence of point defects in crystal lattices is appreciated throughout, and especially in chapter 4, and the effects of solute atoms and precipitating phases are considered. Chapter 3 deals with non-metallic materials and there are studies of the creep of ice. There is very little about casting, though in chapter 11 on "Specific Applications" reference is made to those alloys which can be precision-cast. The same chapter deals with turbines, missiles and creep effects in nuclear reactors.

The main portion of the work is a realistic treatment of stress design in relation to creep problems, and it is an excellent detailed book for the engineer. One example is the behaviour of cold expanded tubes in a tube plate, and thick-walled tubes and cylinders are considered. Fatigue stressing combined with creep is not avoided.

A full list of references is given at the end of each chapter. The authors have apparently decided to omit from the index—though they appear in the text—the names of well known alloys. One cannot turn up the properties of Nimonic, for instance, though some data will be found on pp. 243 and 296. It is also not clear on what basis the final author index has been compiled, for the Hatfield (misspelt Hadfield) time-yield test comes only in the subject index, but the name of Pfeil is not listed.

HUGH O'NEILL.

Publications Received

Annual Report, 1958. Published by the *Centre Technique des Industries de la Fonderie*, 12 Avenue Raphael, Paris 16.

The *Centre Technique des Industries de la Fonderie* was a "war baby." During the German occupation of France, the patriotic and enlightened section of the community used the period for planning for the future. (*Inter alia*, these years were used for redesigning French rolling stock and general modernization of the railway system.) It was Mr. le Thomas, director of the *Centre* both before and since its official creation in 1942, who envisaged a national technical service to the French foundry industry, something on the lines of the much older British Cast Iron Research Association. The 114-page report, just issued, is a testimony to the success which has been achieved.

The *Centre* now employs 334 people of whom 130 are on the staff, all being properly qualified in their professions, and operating from either Paris or one or other of the nine regional laboratories. In 1958, the pressure on the services of these laboratories was not so marked as, say, in 1953, which fact the present reviewer interprets as meaning that the creation of so many data lessens the need for adding to them.

A very useful review is given in the Report of recent researches carried out by the *Centre* and in every case reference is made to publications where the subject is dealt with *in extenso*. The Report makes very interesting reading and the service must be invaluable to the French foundry industry.

Your Crucible. Issued by the Morgan Crucible Company, Limited, Battersea Church Road, London, S.W.11.

The reviewer has a high regard for the publicity matter issued by the Morgan Crucible Company, Limited, but the excellent material contained in this six-page folder should, in his opinion, have been issued either in the form of a small pocket-size booklet or as a wall chart. With the format used, a buyer might easily be forgiven if he mistook the leaflet for sales literature and scribbled on it "file," whereas it is meant for study by those actually operating furnaces. In fact, it is a very sensible guide for the practical man on the care and use of crucibles; presented in another form it would have a better chance of reaching him.

International Illustrated Dictionary (1958 edition). Compiled and produced by the Mechanical Handling Engineers' Association, Association of Crane Makers, Aerial Ropeways Association and Association of Lifting Tackle Makers. (*Gratis* to approved applicants.)

This little book carries about 140 pictures of mechanical-handling equipment and component parts, and says what they are in English, French, German, Italian, Spanish, Swedish and Yugoslavian. Like all other dictionaries, its major use is for those familiar with the subjects covered, and the pictures accompanying the translations pin-point this aspect. Thus, in one case a receiver is illustrated, but except for this particular example, the translations given would be ridiculous. As a specialized dictionary it merits the reviewer's sincere recommendation.

Technical Bulletin, No. TB/RES/134/1, issued by the Shell Chemical Company, Limited, Marlborough House, 15/17, Great Marlborough Street, London, W.1.

In this *Bulletin* is covered very fully the foundry applications of Epikote resins. Stressed is the use of this material for foundry patterns, patternplates and coreboxes. Lightness, smoothness, abrasion resistance and—to coin a word—"repairability" are the outstanding characteristics claimed for patterns made from such a resin basis. As a number of additional materials are used in the preparation of such patterns, a concise directory is given as to the source of supply, and this is extremely useful. The bulk of the *Bulletin* is given over to practical instructions, which are clearly set out and easy to follow. This is an excellent contribution to trade literature.

Research for Industry 1958. Published for the Department of Scientific and Industrial Research by Her Majesty's Stationery Office, Kingsway, London, W.C.2; price 7s. 6d. net.

This is not the report in which to find detailed descriptions of the work of the research associations connected with the foundry industry. For those, one must have resort to the annual reports of the various bodies. This publication briefly covers the activities of all the numerous research associations (from those dealing with glue to motor cars), and will interest those people who like to keep abreast with research in general.

New Catalogues

Iron Castings. Newcast Foundries, Limited, Silverdale, Newcastle-under-Lyme, Staffs, possess a good sense of publicity. They are amongst the handful of ironfounders who display posters at the railway stations. Using a loose-leaf system of presentation, this new catalogue issued by the company deserves commendation on several grounds. There is, for instance, a map for the motorist, showing the location of the foundry and the offer of a car to the works from Stoke station for those arriving by train. Then again, the opening paragraph exhorts the customer to supply the best pattern possible for the making of a given type of casting and then the name of a master patternmaking firm in which the firm has confidence is given. This does make for initial co-operation and to continue this a coloured illustration of a pattern for a machine-tool component is included. The next point made is that a preference is shown for the delivery of a casting protected from rust by a primer. Photomicrographs are printed on white paper and the magnifications are quoted. Then comes a section on stress-relief annealing, followed by illustrations published by courtesy of a customer, of a number of machines for which Newcast has supplied the casting. It is not an extravagantly produced catalogue, but in every way fulfils the needs of the buyer in search of a source of supply of iron castings, and this is what modern trade publicity should do.

Cupola Dust-collectors. It is pleasing to see that in publication No. 79, W. C. Holmes & Company, Limited, Turnbridge, Huddersfield, have discarded the old-fashioned name of "spark arrestors," for truly something more is needed to-day, and the term cupola dust-collector is a more correct appellation. The firm's method, well described and illustrated in the brochure, involves the use of baffles, and a water spray. The amount of water lost is 10 per cent. of a range demanding 75 gall. per min. for a 2-ft. 8-in. cupola to 325 galls. for one of 9-ft. shell diameter. The system is known as the Holmes-Schneible type S.W. collector and the description in the catalogue details the various refinements that have been incorporated in the design.

Vibratory Conveyors. Vimec Equipment, Limited, Warrington, in a 12-page catalogue describe and illustrate quite a variety of vibratory conveyors, one of which is a spiral elevator for cooling whilst lifting material to a higher position. The reviewer has seen one such plant handling shell-moulding sand. A second is a screen mesh conveyor for separating either castings or sprues or tramp metal from the moulding sand. A quotation from the catalogue reads "The vibratory action of the conveyor frees the sand from the castings and suitable section of perforated deck enables the sand and castings to be segregated. Many of these foundry installations contain conveyors of considerable size and range. For instance, units 30-in. wide and 100-ft. long with troughs constructed of ½-in. mild-steel plate are quite common."

Epocast in the Foundry. Issued as *Technical Bulletin* 7 by Furane Plastics Inc., 4516 Brazil Street, Los Angeles 30, California, USA.

The firm issuing this *Bulletin* is amongst the most meticulous in sending their trade literature to the JOURNAL, and this particular *Bulletin* warrants notice because of the clear illustrated descriptions it gives of the practical uses of Epocast resins in foundry practice. At the end of the booklet there is a two-page appendix, which details trial kits for making boxes for core-blowing machines, for ordinary coreboxes, for making matchplates and for making equipment to be used under hot sand. These four subjects are dealt with in the *Bulletin*, which is so interesting that readers are recommended to write to Los Angeles for a copy.

Mains-frequency Induction Furnaces. Information folder No. [illegible]E has been received from ASEA, Vasteras, Sweden, through the British representatives of the company, Fuller Electric, Limited, Fullbourne Road, London, E.17. The folder covers three types of low-frequency electric-melting furnaces, the first of which is a holding furnace of the stationary channel-type. The second is a two-chamber furnace designed for melting and holding copper and aluminium alloys, and the third type is a tilting furnace. After a general description of each furnace, capacities, power-consumption, etc., are detailed for aluminium, brass and copper. Line drawings and illustrations of the plants are included in the brochure.

Factory Ventilation. Greenwood and Airvac Ventilation Company, Limited, Beacon House, Kingsway, London, W.C.2, have issued a four-page illustrated folder to describe and illustrate nine systems of natural and powered ventilation the company has supplied to a like number of totally different types of enterprises. The range dealt with is indeed interesting.

House Organ

Bulletin Mensuel d'Information, No. 100. Issued by the *Association Technique de Fonderie*, 2 rue de Bassano, Paris 8.

This is a special issue designed to commemorate the hundredth issue of the *Association's* monthly *Bulletin*. It opens with an introduction by the president, Mr. J. Lainé, and then prints the portraits of all the presidents since 1911. (With the exception of the first, Mr. Emile Barthe, the reviewer recognizes personally the other eighteen.) Then follows an article on the creation of the *Association* by Mr. Camille Didier, the director of *L'Usine Nouvelle*, and at that time Editor of the *Fonderie Nouvelle*. His campaign in the latter magazine resulted in a meeting held at Nancy, after which the *Association Technique de Fonderie* was launched, and registered in the *Journal Officiel* in January 1911. Mr. Didier was the first secretary and Mr. Ronceray the first treasurer.

Mr. J. Léonard of Belgium, one of the five foreign vice-presidents who have served since the inception of the *Association*, has contributed to the *Bulletin* a very interesting article which stresses the international authority and activities of the *Association*. He quotes a table, issued in 1957, detailing the foreign membership of the *Association*, this the reviewer considers to be in error as there has always been a handful of British members and in this table none is mentioned. Finally, Mr. A. Brizon outlines the history and development of the International Committee of Foundry Technical Associations. The caption beneath the picture showing three vice-presidents at the 1934 Philadelphia conference is also wrong, it should read (left to right) Mr. Léonard, Mr. Brizon and Mr. Vanzetti. In general, the pictures are not too well reproduced.

GEO. ANGUS & COMPANY, LIMITED Mr. J. M. S. Coates has been appointed a director.

Pig-iron and Steel Production

Statistical Summary of April Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in April. Table 3, weekly average production of finished steel in March. Table 4 gives the production of pig-iron and ferro-alloys in April, and furnaces in blast. (All figures are weekly averages in thousands of tons.)

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100.			Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials excl. fuel[1]						Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[3]
1957	328	488	537	325	303	270	275	220	14	417	322	1,444
1958	343	503	478	276	262	227	245	196	9	369	284	1,542
1959—Feb. ..	342	506	473	277	214	199	222	190	5	347	276	1,485
Mar.[4]	342	505	473	276	217	195	221	195	4	363	266	1,479
Apl. ..	342	506	477	299	219	201	231	211	5	387	—	1,459

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in April.* 1959.

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derbys, Leics., Notts., Northants and Essex ..	—	3.6	14.9 (basic)	1.9	0.1	19.2	1.3	20.5
Lancs. (excl. N.W. Coast) Denbighs, Flints. and Ches. .. .. Yorks. (excl. N.E. Coast and Sheffield) ..	1.0	33.3	—	4.6	0.3	38.0	1.2	39.2
Lincs.	—	49.7	—	—	—	49.6	0.1	49.7
North-East Coast	0.5	61.4	—	1.2	0.3	61.9	1.5	63.4
Scotland	1.0	32.2	—	2.1	0.1	33.7	1.7	35.4
Staffs., Shrops., Worcs. and Warwicks.	—	16.8	—	3.9	0.8	19.6	1.9	21.5
S. Wales and Monmouthshire	1.8	90.8	7.2 (basic)	0.8	0.1	100.3	0.4	100.7
Sheffield (incl. small tonnage in Manchester) ..	7.1	33.5	—	11.3	0.3	50.6	1.6	52.2
North-West Coast	0.1	0.9	3.2 (acid)	0.4	0.1	4.5	0.2	4.7
Total	11.5	322.2	25.3	26.2	2.1	377.4	9.9	387.3
March, 1959[4]	11.4	303.3	23.6	22.5	1.9	353.4	9.3	362.7
April, 1958[4]	15.3	346.2	21.6	22.2	2.5	396.8	11.0	407.8

TABLE 3.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1957.	1958.	1958.	1959.	
			Mar.	Feb.	Mar.*
Non-alloy steel:					
Ingots, blooms, billets and slabs[5]	5.0	4.6	5.2	4.3	4.1
Heavy rails ..	11.2	10.2	11.4	8.2	7.3
Sleepers	1.3	1.2	0.7	1.0	0.7
Fishplates and soleplates	0.8	0.7	1.0	0.5	0.3
Plates: (i) ⅛ in. thick and over ..	34.0	29.6	35.7	27.4	25.1
(ii) Under ⅛ in. ..	20.3	17.7	20.2	18.0	17.2
Other heavy prod.	53.0	41.8	56.8	35.1	35.5
Ferro-concrete bars	8.9	7.6	8.2	6.6	7.9
Wire rods	23.3	21.5	22.7	22.3	21.1
Arches, etc. ..	11.0	8.6	10.4	8.6	8.7
Other light sections	38.7	29.1	33.0	30.4	28.5
Bright steel bars ..	7.0	6.2	7.1	7.0	6.3
Hot-rolled strip ..	23.1	22.6	25.0	27.2	26.7
Cold-rolled strip ..	7.1	7.0	8.5	7.7	7.0
Sheets.(i) Hot-rolled	13.0	10.6	12.1	10.4	10.8
(ii) Cold-reduced ..	29.1	31.1	32.0	34.2	33.3
Tinplate:	18.8	18.7	17.3	21.2	18.9
Blackplate	1.0	0.8	1.0	0.8	0.7
Tubes up to 16 in.. .	22.1	19.0	2.1	18.7	18.4
Tube, pipe fittings	0.5	0.4	0.4	0.4	0.4
Tyres, wheels, axles	5.1	4.5	5.8	2.9	3.0
Forgings (excl. drop)	3.1	2.6	3.1	2.2	2.0
Steel castings ..	4.6	4.2	5.3†	3.7†	3.6†
Tool and magnet ..	0.3	0.2	0.3	0.2	0.2
Total	342.3	300.5	345.3	299.0	287.7
Alloy steel	17.8	16.1	20.9	17.3	17.0
Total deliveries from U.K. production[6]	360.1	316.6	366.2	316.3	304.7
Imported finished steel	9.6	7.1	10.9	4.5	6.3
	369.7	323.7	377.1	320.8	311.0
Deduct: Intra-industry conversion[7] ..	48.2	41.2	49.0	45.9	46.1
Total new deliveries	321.5	282.5	328.1	274.9	264.9

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys., Leics., Notts., Northants and Essex	19	2.5	21.6	15.7	0.2	—	40.0
Lancs. (excl. N.W. Coast), Denbigh., Flints. and Cheshire .. Yorks. (excl. N.E. Coast and Sheffield)	7	—	20.6	—	—	1.3	21.9
Lincs.	8	—	41.6	—	—	—	41.6
North-East Coast	17	2.8	40.0	—	—	0.7	43.5
Scotland	6	0.6	14.2	0.7	—	—	15.5
Staffs., Shrops., Worcs., Warwicks	4	—	5.9	0.9	—	—	6.8
S. Wales and Monmouthshire	9	2.9	41.9	1.0	—	—	45.8
Sheffield ..	2	—	3.5	—	—	—	3.5
North-West Coast	7	11.6	—	0.2	—	0.9	12.7
Total ..	79	20.4	189.3	18.5	0.2	2.9	231.3
March, 1959[4] ..	80	17.6	181.8	18.5	0.3	3.0	221.2
April, 1958[4] ..	91	26.1	202.5	24.1	0.6	3.6	256.9

[1] Used in non-food manufacturing industries.

[2] Weekly average of calendar month.

[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.

[4] Five weeks, all tables.

[5] Other than for conversion into any other form of finished steel listed.

[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.

Material for conversion into other products also listed in this table.

FOUNDRY

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A Modern Foundry with CONVEYORS by

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Photograph shows:

The August's Mould Conveyor (closing to pouring, to cooling, to shakeout), which is a unit of the large August's Mechanised Sand Plant.

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Ironfounding Industry in 1957

The Report on the Censuses of Production for 1955, 1956 and 1957*, covers the activity of iron foundries in Table 0, and carries comparisons with the years 1951 and 1954. During the period under review—in conformity with our recent Editorial opinion—the value of the output has been consistently increasing. It has risen from £150,000,000 in 1951 to £188,000,000 in 1957. The value of the actual production is one to two per cent. higher. Purchases of raw materials and fuel jumped from £60,000,000 in 1951 to £88,000,000 in 1957, but the cost of these goods which were actually used was, over the period, some one per cent. lower, and the stability of the market is reflected in the change of value of the stocks carried each year. Sometimes it increased by £1,800,000 and in other years by a mere £156,000.

Iron foundries must call in other firms for processing their castings to an extent much greater than we ever imagined. We suppose the figures given, in this context, which have increased in the period under review from £1,500,000 to £2,600,000, must relate to vitreous enamelling, shotblasting, heat-treatment and " blowhole " filling. Employment in iron foundries has steadily decreased over the years and for the section surveyed it declined from 120,706 in 1951 to 105,453 in 1957. Although these figures do not cover the whole industry, they should be representative of what has happened on a national scale in the industry. Though fewer were employed, the wages bill went up from £42,000,000 to £53,000,000.

Perhaps the most illuminating figures for future prosperity are those relating to the money spent on new buildings and plant. In 1951, £1,400,000 was spent on new building work, but by 1956 this figure had risen to £2,500,000 and in 1957 it was £2,300,000. The expenditure on new plant reached its maximum in 1957 at £6,200,000. In other years it was: 1951, £3,500,000; 1954, £2,900,000; 1955, £3,700,000 and in 1956, £5,800,000. From the figures published it is evident that there is quite a considerable secondhand market in foundry plant, as in each year dealt with there has been approximately £100,000 worth sold. Presuming this figure is, or will be, included in new plant, it makes but an insignificant impact on the gross figure. It is also revealed that the iron foundries are good customers of the transport industry. In 1957, they bought £618,000's worth of vehicles and paid £5,300,000 for the transport of their goods. Finally, it is pleasing to note that with all the labour-aiding equipment bought, the value of the net output per person employed has risen during the six years covered by the Census from £669 to £894.

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* Vol. 1. Published by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 2s. net.

National Foundry Craft Training Centre

Full Report on Activities in 1958

During the year 1958, 127 apprentices attended at the National Foundry Craft Training Centre, and the courses held, together with the number of apprentices attending each, were as follows:—Three first courses, 40 apprentices; three second courses, 31 apprentices; three third courses, 31 apprentices and two fourth courses, 25 apprentices.

Training followed the same pattern as in previous years, the syllabus having become established from experience gained during the running of the Centre for the past ten years. The Centre, normally, can cater for 132 apprentices each year and it can be seen from the above figures that the capacity of the Centre was fully occupied in 1958.

Residential Club

The number of apprentices who resided at the club during their period of training at the Centre was 114, and this gives some idea of the national character of the Centre, a feature which is further emphasized by the fact that the founders using the Centre and club during the past year came from all parts of the British Isles. Members of the management committee continued to make regular visits to the club to meet trainees in residence.

Visits to Foundries

It is a normal part of the curriculum to visit different types of foundries during each course and a total of 35 visits were paid to foundries in the Midlands.

Acceptance of Applications

In the early part of the year, it became increasingly clear that with the number of applications which were coming forward there would inevitably be some delay in finding places for new entrants, and at one stage there was a waiting period of over 12 months. This position caused a great deal of anxiety both to the management committee and the trustees. As a temporary measure of relief, arrangements were concluded towards the end of the year, under which the training of apprentices undergoing second courses should be carried out at the training centre of the Stanton Ironworks, Company, Limited, near Nottingham. The trustees and management committee wish to express in this report their thanks and appreciation to this concern, for the offer to accommodate trainees during this difficult period.

Need for Expansion

The circumstances outlined in the proceeding paragraph emphasize the need for the expansion and in fact the rebuilding of the present Training Centre. It is worth recalling that when the idea of the Centre was first considered, it was established on the most modest lines in the nature of an experiment, and at that time it was visualized that if the venture proved a success similar training centres might be set up in other parts of the country. Experience proved that the Centre could provide a most valuable means of training for the industry's apprentices and it became the National Training Centre for the whole of the foundry industry. Due to lack of funds however, the Centre has had to operate under conditions which have imposed severe limits upon its activities.

The conviction is held that, had more commodious quarters been available both for training and residential purposes, the Centre would have made even more progress than it has done already. When one considers the establishments which have been set up for training on the Continent it is a reflection upon the foundry industry in the United Kingdom that the single training centre has such limited facilities.

Worshipful Company of Founders

During the year the Worshipful Company of Founders made an offer of an annual prize and diploma to be awarded to the best student completing his courses at the Centre each year. The management committee have been seriously considering the most equitable method of making this award and it will be first presented in 1959.

IBF New Address

The impending move of the head office of the Institute of British Foundrymen to London was announced in last week's issue. The new address will be 14, Pall Mall, London, S.W.1 (telephone WHItehall 7141-2). (Communications posted to the Institute after November 12 should be sent to the new address.)

E. S. Lord's Raffle at Bingley Hall

As an added attraction during the Foundry Exhibition in Birmingham, E. S. Lord, Limited, sent out a special invitation card. Visitors to the Exhibition were asked to leave this card at the Lord stand, thereby qualifying for inclusion in a "draw" for a picnic case for four people. The case was won by Mr. C. E. Morrish (ironfoundry manager of Ball Bros. (Engineers), Limited, Stratford-on-Avon. In the illustration Mr. Morrish is seen receiving the picnic case from Mr. Tweedale, sales director of E. S. Lord, Limited. On the left is Mr. F. V. Ball, managing director, and on the right Mr. Wiles, works manager.

Modern Methods of Analysis for Cast-Iron

Report on the recent BICRA Conference in London

Representatives of 160 member-firms were present at the British Cast Iron Research Association's recent conference on "Modern Methods of Analysis," held at the Royal Commonwealth Society's Rooms, in London. The conference was designed to bring to the notice of chemists in the iron industry the recent work done in the Association's laboratories, and the research carried out by the Methods of Analysis Sub-committee.

BCIRA's recent conference in London was opened by Mr. P. A. Russell (of S. Russell and Sons, Limited), chairman of the BCIRA Research Board. Mr. Russell said that the Association's Methods of Analysis Sub-Committee, under its chairman, Mr. N. L. Evans (of Imperial Chemical Industries, Limited (Alkali Division)), was in a very real sense a working committee, and was carrying out exhaustive investigations on routine methods commonly in use, as well as investigating the applicability of the new methods. A handbook of selected methods, approved by the sub-committee, had just been published and was now on sale for the first time at the conference[1]. This handbook was designed to give the chemist at the bench a selection of tested methods. The first part dealt with the analysis of ordinary pig- and cast-irons. Further parts, to be published later, will deal with the analysis of alloy irons, ferro-alloys, slags, refractories, coke and other materials used in the foundry. Mr. Russell concluded by saying that a plastic binding had been used, which permitted the book to be used at the bench without damage to the covers.

Methods of Analysis Sub-committee

Its chairman, Mr. N. L. Evans, described the work of the Methods of Analysis Sub-Committee since its formation in 1950. Its representation, he said, was broadly based and included not only representatives of member-firms, but also users, other research associations and educational establishments. During the nine years of its existence a number of investigations had been carried out, and several papers had been published. The chairman paid tribute to all the members of the sub-committee for their very active co-operation in the practical work, and referred particularly to the work of Mr. W. E. Clarke, chief chemist at the Association, who had not only collaborated fully in the experimental work, but had also, in his capacity as Secretary, co-ordinated this work and prepared it for publication. In its earlier stages the sub-committee had also benefited from the advice and guidance of Mr. W. Westwood, former chief chemist of the BCIRA. The sub-committee had been mainly concerned until now with the perfecting of routine methods, and papers had appeared on total carbon[2], graphitic carbon[3], combustion sulphur[4], phosphorus[5], and bismuthate manganese[6]. The chairman ended by saying that attention was now being turned to methods suitable for submission as British Standards, and that co-operative work was being carried out on a method for magnesium in nodular-graphite irons developed at the Association's laboratories[7].

PAPERS PRESENTED

Sampling of Pig- and Cast-iron for Carbon Determination

By W. E. Clarke (chief chemist, BCIRA)

Mr. Clarke's paper dealt with the sampling of flake graphite and nodular graphite irons for carbon determination, and described one of the first co-operative projects carried out by the Methods of Analysis Sub-committee. It has been known for some years that solid samples must be used for certain types of casting, such as ingot moulds, if reproducible results were to be obtained. The sub-committee had set out to determine the limits within which drillings were permissible. Four different sampling techniques had been examined: (1) Solid samples; (2) drilling, with a ½-in. drill at a speed of 100 to 150 r.p.m. (the drillings then being used without further treatment); (3) drillings taken as in (2), but sieved on 60-mesh and proportionate parts used, and (4) drillings ground to pass through a 30-mesh sieve. It was found that solid samples were essential for accurate results with castings of heavy section containing large graphite flakes, and for all types of nodular graphite iron. For routine analyses of lighter-section castings drilling could be used, but the work had shown that sieving or grinding of drillings was inadvisable, since this invariably led to a loss of carbon. To obtain solid samples from an existing pig or casting, a hollow miller could be used or slices cut with a hacksaw. In sampling pig-irons, particularly sand-cast pigs, segregation of the carbon must be taken into account and a strip, representative of the pig from top to bottom, should be taken and cut into suitable-sized pieces (weighing about 1.5 gm. each) for carbon determinations. Carbon must be determined on each piece. The overall carbon content could then be calculated. When it was possible to sample liquid metal, the sub-committee had recommended that solid samples should be taken for carbon determination using either a pin mould (as recommended in BS.1837, Part 1, Amendment No.

1) or suction samples obtained with a silica tube of $\frac{1}{8}$-in. bore.

Application of the Rotary Sampling Machine to Cast-iron

By H. Green (BCIRA Chemical Section)

The above work had been carried out before the investigation of the rotary-sampling-machine technique, which is described in this paper. With this technique, representative samples can be obtained in less than a minute which gives excellent results for carbon and combustion sulphur on all types of iron. By slight modifications of solution technique the samples can be used for the determination of silicon, manganese and phosphorus. The machine described by Mr. Green was based on the original design of the late Mr. S. Westberg, but considerable improvements had been made to it in the Association's laboratories, partly as a result of tests carried out in the foundries of a number of member-firms[8]. Mr. Green's paper was accompanied by a short film, made at the Association, demonstrating the use of the machine.

Solvent Extraction Techniques in Ferrous Analysis

By W. E. Clarke

In this paper the principle, and some applications in the foundry laboratory, of solvent extraction techniques in separating interfering elements are described. The element to be removed is converted into an uncharged co-valent compound, which can be dissolved in an organic solvent immiscible with water and thus separated. Using the butyl-acetate separation, more than 99 per cent. of the iron present in a 5- or 10-g. sample can be removed by a single extraction. Using the conditions developed in the Association's laboratories solution and extraction take less than 10 minutes. This technique has been employed in the development of rapid methods for aluminium in cast-iron and ferro-silicon[9], magnesium in nodular iron[7], alumina[10], lime and magnesia[11] in slags, etc., and has proved particularly valuable in the analysis of trace elements. To illustrate the extreme simplicity of this technique a colour film made at the Association was shown. In this film the complete method for the determination of magnesium in nodular irons by the Rooney and Carter method was demonstrated by Mr. Clarke. In this method a 5-gm. sample is taken, dissolved in agua regia, and the iron removed by a butyl-acetate separation. After suitable adjustment of acidity the remaining traces of iron, together with titanium and other residual elements, are extracted with cupferron into chloroform. Nickel and manganese are then extracted as their diethyldithiocarbamate complexes. The magnesium is now left in a solution which is free from interfering elements, and can be titrated with E.D.T.A. In this pure solution the end-point is very sharp and easily detected, even in artificial light. The determination takes just under an hour.

Instrumentation in the Foundry Laboratory

By R. C. Rooney (BCIRA Chemical Section)

Mr. Rooney, who is engaged in the investigation of methods for trace elements at BCIRA, dealt very thoroughly, and with admirable clarity, with the various types of instrumentation now employed in analytical chemistry, and instanced their applicability to the problems now confronting chemists employed in foundry laboratories. He dealt exhaustively with the various filter-type absorptiometers and spectrophotometers now available, and compared the performance of filters with monochromators in the selection of narrow wavebands of light. Dealing with flame photometry, a technique of rapidly increasing importance, Mr. Rooney described the construction and performance of a sensitive recording flame spectrophotometer built at the Association. Members were invited to visit the Alvechurch laboratories to see a demonstration of this instrument.[12, 13]

Analysis of Cupola Slags

By W. E. Clarke

Analysis of cupola slags has recently become of increasing importance, and Mr. Clarke pointed out how the need for rapid results had led to the development of a new scheme of analysis. The disadvantages of the classical scheme were avoided by the use of (*a*) instrumental methods, *e.g.*, spectrophotometric methods for iron, manganese and titanium; (*b*) volumetric methods, either not requiring preliminary separations or using solvent extraction separations, and (*c*) by making each determination separate, so that hiding of errors in summation was avoided.

Spectrophotometric Detection of End-points

By J. Sneddon (BCIRA Scottish Laboratories)

A paper by Mr. J. Sneddon, of the Association's Scottish Laboratories (read in his absence owing to illness by Miss H. Horton) described experiments he had carried out on the detection of end-points in E.D.T.A. titrations of calcium and magnesium, using an absorptiometer or a spectrophotometer, This method overcomes the difficulties encountered by some analysts in detecting these endpoints visually.

Analysis of Trace Elements in Cast Iron

By R. C. Rooney

Mr. Rooney, who has specialized in this field, referred to the recent metallurgical interest in trace elements, and the need for accurate methods for their determination. Even using modern instruments, like the cathode-ray polarograph, separations were generally necessary. The older precipitation methods, such as zinc oxide, were usually unsatisfactory when really low-level traces were in question. This had led to an examination of several separation techniques, including chromatography and ion-exchange, but solvent extraction had been found to be the best, most generally applicable and simplest method. For the final determination, a modern polarograph, spectrophotometer, flame photometer or fluorimeter could be used. A factor limiting the lower level of determination was the blank from reagents, which Mr. Rooney considered should never be more than 50 per cent. of the total.[14, 15, 16, 17]

CONFERENCE DINNER

On the evening of the first day of the conference a dinner was held at the Connaught Rooms, Gt. Queen Street, Kingsway, London, W.C.2, and was attended by a considerable proportion of the delegates. The chair was taken by Mr. N. L. Evans, chairman of the BCIRA Methods of Analysis Sub-Committee. Amongst the guests was Mr. C. R. B. Spencer, general secretary of SIMA.

EXHIBITION OF EQUIPMENT

An exhibition, arranged by the Scientific Instrument Manufacturers' Association, of equipment for instrumental methods of analysis was held during the conference. The participating firms, and their displays, were as follow:

Electronic Instruments, Limited—fluorimeter, auto titrometer M24 and Ph meter 23A.

Evans Electroselenium, Limited—titrator, absorptiometer, colorimeter and flame photometer.

Evershed & Vignoles, Limited—two Tinsley polarographs.

A. Gallenkamp & Company, Limited—two furnaces.

Griffin & George, Limited—gas liquid chromatography outfit and Griffin-BCRA bomb calorimeter outfit.

Hilger & Watts, Limited—H.750 Spekker absorptiometer, H.700 Uvispek spectrophotometer and direct-reader spectrograph.

Nash & Thompson, Limited—polaroscopes.

L. Oertling, Limited—balances.

Southern Instruments, Limited—absorptiometers and polarographs.

Townson & Mercer, Limited—vacuum moisture-testers and Ströhlein carbon-in-steel estimation apparatus.

Unicam Instruments, Limited—SP.600 spectrophotometer and SP.900 flame spectrophotometer.

Some of the displays are dealt with at length in the following paragraphs:

Electronic Instruments, Limited

Direct-reading Fluorimeter: A sensitive and stable instrument designed to measure concentrations of solutions. Most solutions which fluoresce in the visible spectrum can be analysed. The instrument has high discrimination and is suitable for measurements of the trace concentrations of certain metals. It has a concentration range between 1 part in 10^{-6} and 1 part in 10^{-10}.

Direct-reading pH Meter (Model 23A): A meter for the measurement of acidity and alkalinity. Two of its many applications are the pH measurement of sand, and the pH of galvanizing solutions. It can also be used for redox titrations to determine iron.

Automatic Titrimeter: Instrument which performs automatically routine laboratory titrations. It will titrate solutions containing metals such as cobalt, aluminium, copper, iron, chromium and manganese, and can also be used in carbon and sulphur determinations. pH, redox, complex forming or precipitation titrations can be performed with suitable electrodes. Two input sockets are provided so that two separate and different titrations can be performed in sequence.

Hilger & Watts, Limited

Spekker Absorptiometer: Used for routine analysis of ferrous and non-ferrous alloys, cast-iron, etc., by photoelectric colorimetry. The sample is dissolved and a suitable reagent used to form a coloured complex of the element being determined. The Spekker has a null-setting measuring system, which uses two balanced photocells. Readings of either optical density or transmission can be taken from the long linear scale, which is graduated from 0 to 1.3D.

Uvispek Spectrophotometer: An instrument which covers the visible region of the spectrum, and the ultraviolet region, where many metallic compounds have their main absorption bands. It may also be used for flame photometry and atomic-absorption spectroscopy.

Hilger Polyvac Automatic Spectrograph: Used for measurement of the intensity of spectrum lines emitted by elements when they are excited in an electric discharge. The whole sequence of operations is controlled automatically—from the time the operator puts the sample in the discharge stand to the time the instrument presents the results of the analysis tabulated on a sheet of paper. There are two models of the Polyspek, one with a single direct-reading head, the other with two; the latter model has also provision for photographing the spectrum. Each direct-reading head deals with 12 elements, one of which must be used as an internal standard—generally the base metal. Thus the Polyspek-24 may be used for determining 11 elements in two differently-based alloys, or 23 elements in a single alloy. The time taken to analyse 23 elements is about four min., and about two min. for 11 elements.

Nash and Thompson, Limited

L.P.54 Polarograph: is a conventional d.c. polarograph with one unusual feature which makes it semi-automatic. A recorder is built into the instrument, and light reflected from the galvanometer shines on the paper from behind. The knob which increases the voltage across the electrolyte cell also advances the recorder paper, and one can plot the polarographic curve directly on to the paper. Sensitivity is similar to other d.c. polarographs.

L.P. 55A Polarograph: A photographic recording instrument in which great sensitivity is obtained by suspending the galvanometer on a cantilever 3 ft. above the instrument. Operation is motorized and fully automatic, once the voltage range that it is required to scan has been set on the instrument. Automatic recording of abscissae after every 100 or 200 mv., is performed.

P.567 Polaroscope: An oscilloscope specially adapted to polarographic analysis. The oscillogram shown on the CR tube is oval in shape for a pure basic electrolyte, the upper half representing the cathodic, and the lower half the anodic process. Following the introduction of a depolarizer into the electrolyte, the curve shows incisions in both anodic and cathodic parts. The depth of the incision is proportional to concentration, and its position is characteristic of the depolarizer. The method is suitable for analysis in the concentration range 10^{-3} to 5×10^{-5}M. Lower concentrations can be reached by special techniques. Titrations can be performed by using twin electrode systems, and adding titrant until the depth of incisions coincide.

L. Oertling, Limited

One-pan balances: Range of balances incorporating full mechanical manipulation of all weights on all models. The beam is of delta form made from light alloy and, together with all the mechanism, is totally enclosed. Release of the balances is operated by a press bar, and the knives and planes are fully protected from damage by the Release-o-matic mechanism. The controls are grouped in order to give rapid and fatigue-free weighing. The pans are designed for ease of access, and the appearance of the instrument is suitable for both old and new laboratories.

It has been designed to give the user reliable and rapid weighing with a minimum of service and attention. The range of balances available is as follows:

Model	Capacity	Sensitivity per half division	Mean Standard Deviation
HO1	200 gm.	0.10 mgm.	0.05 mgm.
HO2	200 gm.	0.50 mgm.	0.20 mgm.
HO3	100 gm.	0.05 mgm.	0.03 mgm.

Two-pan balances: This range of balances includes a semi-micro balance with a sensitivity of 0.1 mgm. per scale division (Model FO7), with automatic weight manipulation up to 1 gm. The full range now comprises fourteen different models, with different sensitivities.

Southern Instruments, Limited

K1000 Cathode-ray Polarograph: Amongst advantages claimed are: the entire polarogram is reproduced on the screen once every seven sec.; very small currents may be measured and made to occupy the full scale, the effective sensitivity being increased by the peaked nature of the waves, especially in the case of multi-electron reductions; the shape of the waves is such that waves differing in half-wave potential by as little as 0.05 v. may be separately measured. A derivative circuit is brought into operation (a) to resolve two direct peaks which are close together, or (b) to measure the concentration of a trace element when a large preceding reduction is taking place.

K636 Anodic Conversion Unit: This instrument enables the cathode-ray polarograph to be used for the determination of waves due to oxidation, in addition to and without interference to its normal use for reduction waves. It comprises a cathodic-anodic switch, a 2-v. dry accumulator, together with the necessary connectors to the mercury electrode system and to the polarograph.

Townson & Mercer, Limited

Vacuum Moisture-tester: for accurate estimation of the moisture content of foundry sand, coal and coke. Weighing and heating is carried out in a vacuum, which makes for accuracy irrespective of treatment of the sample.

Carbon-in-steel Estimation Apparatus: A modern edition of the well-known system for estimating carbon in steel by burning off a sample of the steel in a current of oxygen and absorbing and measuring the volume of CO_2 produced. By means of a special calibrated and movable scale a direct reading of the percentage of carbon may be obtained with a simple absorption. Two types of instruments are available, one with a scale reading directly from 0-1.5 deg., the other reading from 0-4.5 deg.

Unicam Instruments, Limited

SP.600 Spectrophotometer: with a range of 360-1000mμ is suited to a great variety of metallurgical determinations. It is a true spectrophotometer, employing a glass prism which makes for precise wavelength selection over a wide range. A series of free detailed method sheets is published for use with the instrument, many of them dealing specifically with metallurgical determinations.

SP.900 Flame Spectrophotometer: A large number of metallic ions, when suitably excited in a flame, give out a characteristic emission which may be measured for the purposes of qualitative and quantitative analysis. The method has the particular advantages of speed, and a minimum of sample preparation.

A fused-silica prism and photomultiplier detector, in incorporated and the range 250-1020mμ is covered. Basically, the instrument is direct-reading, with a spot galvanometer, but a signal outlet is provided for alternative use with a standard potentiometric recorder.

A. Gallenkamp & Company Limited

Tube Furnace (FS-205, size 1): has a maximum temperature of 1,200 deg. C., and is manually controlled; internal dimensions of this model are 12 in. by 3 in., but larger sizes are available.

Tube Furnace (FS-400, size 1): This furnace operates at a maximum temperature of 1,500 deg. C., with automatic controls. It is used with a special transformer, in which the output voltage is automatically adjusted to compensate for changes in element resistance with temperature, or due to ageing.

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WILMOT-BREEDEN (HOLDINGS), LIMITED—Mr. J. T. Cross has been appointed a director.

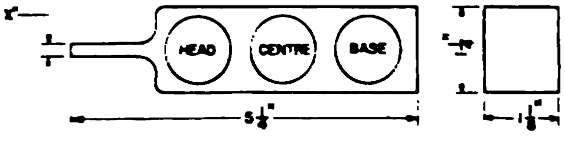
American Letter

Ultrasonic Testing of Aluminium Castings*

High-strength, high-quality aluminium castings have become a commercial reality. Since in some cases radiography does not clearly distinguish between high-quality and ordinarily acceptable aluminium alloys there is a real need for a non-destructive test method to do this job. Commercially-available ultrasonic test equipment was used throughout an investigation which was carried out by the authors. This equipment was a combined pulse generator and signal receiver.

First Experiment

Castings as shown in Fig. 1 were made at a pouring temperature of 696 deg. C. One casting (Group 1) was poured from a heat degassed for 10 min with chlorine, another from a heat which was untreated (Group 2), and a third from a heat which was stirred 2 min with green wood (Group 3). Each casting consisted of five samples, with different-sized gates, which were cast simultaneously from a central hub. Each sample was identified as to pre-pour treatment (Group 1, 2 or 3) and gate size (A, B, C, D or E). The samples in Group 1 were designed to be least porous, Group 2 more porous, and Group 3 most porous. Fig. 1 shows where each specimen was ultrasonically examined, at positions designated head, centre and base.



GATE	A	B	C	D	E
X	3/16	5/16	9/16	7/8	1 1/4

FIG. 1.—*Diagram of one of the samples used in experiment 1, showing the parts which were ultrasonically tested.*

Results:

It was found that, for a given gate size, ultrasonic attenuation increased as porosity increased. Variations in the degree of porosity within any one sample were readily apparent. The head sections of samples with the smaller gate sizes tended to be more porous than the base sections, which fact was substantiated by radiographs. Reflectograms showed that ultrasonic attenuation tended to increase at the head sections.

Second Experiment

Aluminium-alloy test-plates (7 per cent. Si 0.3 per cent. Mg) were then cast, with a chill on one edge and a riser at the opposite edge. Near the chill the tensile properties obtained were 16.9 tons per sq. in. ultimate tensile strength, 11.6 tons per sq. in. yield strength, and 8 per cent. elongation. Near the riser the properties fell off to 14.7 tons per sq. in. ultimate tensile strength, 11.6 tons per sq. in. yield strength, and 2 per cent. elongation. Radiographic examination was not sensitive to these changes, but when ultrasonic attenuation measurements were made at various locations in the plates there was a definite increase in attenuation [illegible] near the chill edge. Other experiments were made on samples [illegible] with [illegible] in [illegible] the attenuation [illegible] were markedly affected by the presence of gas and microshrinkage in the samples. The ultrasonic test [illegible] however, distinguish between coarse and fine grain sizes.

Tensile and Shear Strength of Green Sand*

The authors conclude that the [illegible] of a green-sand [illegible] on green shear and tensile strengths and that increasing tensile and shear strength [illegible] the moisture content which is required to [illegible] the same green [illegible] clay. The authors also studied the effect of [illegible] of ramming on green tensile and shear strength using AFS rammer equipped with two different ramming weights (14 and 2 lb) which were dropped a distance of 2 in.

Effect of Increased Ramming

It was found that increased ramming caused green tensile strength to reach a maximum of between 3 to 4 lb per sq. in. in the 8 per cent. western bentonite mixtures. Above this percentage, increased ramming caused erratic green tensile strength. Experiments with the 10- and 12-per cent. western bentonite mixtures showed that green tensile strength increases uniformly as the shear strength increases, due to ramming to higher bulk densities and mould hardness. At the 10 to 12-per cent. western bentonite level, tensile strength does not level off at a fixed value as in the case of the 8-per cent. western bentonite, even when rammed to an average mould hardness of 95. The higher clay content mixtures are regarded as clay saturated sands, *i.e.* sands in which the addition of more clay does not produce a further increase in strength at a given hardness. Southern-bentonite and fire-clay bonded sands were studied in the same way. Since the relationships of green shear, tensile and compression strengths, mould hardness and bulk density proved to be similar to those obtained with western bentonite, the same conclusions were drawn.

Effect of Sand Fineness

The effect of sand fineness and sieve analysis on green tensile and shear strengths was also investigated. Sands varying in fineness from AFS 49 to AFS 85 showed no effects on the relationship of green tensile, shear strength, etc. The green tensile, shear and compression strengths, and mould hardness relationships, were not affected by cellulose additives.

High-hardness Moulds

The results of these experiments have important applications in green-sand moulding operations. For example, if a moulding sand containing 4 per cent. clay is moulded on powerful moulding equipment to hardnesses greater than 90, the mould is likely to crack, drop or hang up on the pattern. On the positive side, a clay-saturated sand is one best suited for producing high-hardness moulds (90 to 95 mould hardness), and high-strength moulds. Powerful moulding equipment may be used to develop high-strength moulds, which can be drawn from patterns without mould failure.

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* Synopsis of a paper, by H. Smoien and H. Rosenthal, presented at the AFS Congress in Chicago (April 13 to 17), and published in full in the May issue of *Modern Castings*. Mr. [illegible] is electronic scientist, and Mr. Rosenthal, metallurgist, at Frankford Arsenal, Philadelphia.

* Synopsis of a paper, by R. W. Heine, E. H. King and J. S. Schumacher presented at the AFS Congress in Chicago (April 13 to 17), and published in full in the April issue of *Modern Castings*. Mr. Heine is associate professor, University of Wisconsin, Madison; Mr. King is president, and Mr. Schumacher chief engineer, of [illegible] Company, Cincinnati, Ohio.

Learning to Cast Steel at Lloyd's

A Day in the Lives of three Young Men

The heading illustration shows the three young men entering Bourne House, F. H. Lloyd's training centre. On the lowest step is Jack, his face betraying slight inward trepidation because it is his first day. Harry, in between, has an air of greater assurance stemming from his three-year status. Jim, on the threshold, radiates good-humour and confidence; at the end of his five-year apprenticeship he faces the future backed by the knowledge of a craft well learned.

Well-established now is the apprentice-training centre of F. H. Lloyd & Company, Limited, at Bourne House, near the company's main works at Wednesbury, in the heart of the industrial Midlands. To indicate the way in which training for steelfounding is organized at the centre, accounts of their day's experiences were compiled for three young men, who for this purpose shall be covered by the *noms des plumes,* Jack, Harry and Jim. For Jack it was his first day at the Centre; Harry was in the middle of the course and Jim had arrived at its final stages. These accounts of the Lloyd training set-up—which covers also the requirements of other steel foundries (Parker Foundry (1929), Limited, and Lloyd's (Burton), Limited) in the group—are especially interesting at the present time as it is likely that—subject to approval from the main European Committee—the practical work of next year's International apprentice Competition will be staged at the company's main works.

Jack's First Day

I walked up the steps to Bourne House, straightened my tie and tried to look confident. This was the F. H. Lloyd company's training department, where I was to spend much of my apprenticeship to steelfounding—which I had already learned at my interview consists of every job between patternmaking, moulding and despatch of finished castings. It had also been made clear that the way to an executive position with the firm was open to me if I proved capable of benefiting from further instruction. I had also been told that, initially, the staff of Bourne House, consisting of the training officer, physical-training instructor and the foundry and engineering instructors, would regulate my future.

On entering the Centre, I was welcomed by a secretary who ushered me into a room where more apprentices were waiting. At 8.30 a.m. we were shown into the lecture room, where we were told to write our names on cardboard so that we could be identified at a glance. After this we were introduced to members of the staff. The next thing on the programme was to get "signed on"; this consisted of a visit to the works' employment office—the signing of various forms and receiving leaflets, sick-benefits booklets and information of a general nature.

At about 9.30 a.m. we were shown a film of F. H. Lloyd's works and at "break"—10.0 a.m.—we were taken to the dining room where the boys eat. After this we were given a test, one of three, each getting more difficult.

11.15 a.m. was physical training time and I'm sure I've never had so much exercise. In shorts and vest we ran to the p-t field, where we played soft-ball and took part in various exercises. This we did until 12.15, when we ran back to Bourne House, had a shower and got dressed. Then we were shown how to "clock in", and were told to be back to punch the clock before 1.30 p.m. I think the first day I was back at 1.10 p.m., for fear of being late.

Re-assembling at 1.30 p.m., we were told we were to have a talk by the wages supervisor on the subjects: wages and how they were compiled; the necessity for clocking in and out; about sick pay, and generally all that an apprentice should know about the wages department. His talk continued until about 3.0 p.m. At this time we felt more relaxed, and the training officer and an instructor made tape-recordings of our names, addresses and ambitions. After tea break (3.40 p.m.) we were taken to the medical department, where we were examined and measured for height and weight.

At about 4.30 p.m. we were given blocks of wood of varying shapes and indulged in some sketching practice. To wind up the day we were told what we were going to do on the following day and at 5.30 p.m. we "clocked out," feeling we had made an entry into the industry and finding it a little less bewildering than we had feared.

TABLE 1.—*Typical Apprentice Record Card (Front Side) compiled in the Training Department of F. H. Lloyd & Company Limited.*

Name: *John William Smith.*
Address: *5042, Park Lane, Wednesbury.*
Clock No.: *Z.220.*
Apprenticed as: *Moulder.*

Date of Birth: *12.9.38.*
Date Engaged: *22.8.55.*

Date: *22.8.55.*

Date.	Move to:	Total period in department.	Report from:	1	2	3	4	5	Total.	Remarks, awards, etc.
22.8.55	*F.T.S.*									
10.2.56			*F.T.S.*	*17*	*26*	*13*	*18*		*74*	*1956*
4.5.56	*28.3.56. Sand Lab.*		*F.T.S.*	*17*	*30*	*17*	*18*	*1*	*82*	*Works Reports 76*
24.5.56			*S.L.*	*17*	*26*	*17*	*18*		*78*	*90 per cent*
20.8.56	*20.8.56, J.2 Box*		,,	*17*	*26*	*17*	*15*	*2*	*75*	*Timekeeping 14*
			J.2	*17*	*26*	*13*	*15*		*71*	*1st Year, Group 2. £4*
19.11.56	*Methods*									
4.1.57			*Methods*	*13*	*17*	*26*	*10*	*2*	*66*	
11.2.57			,,	*13*	*26*	*13*	*15*		*71*	
4.3.57			,,	*17*	*26*	*13*	*15*		*71*	
2.4.57			,,	*17*	*26*	*17*	*18*	*2*	*78*	
30.4.57			,,	*17*	*26*	*13*	*15*	*1*	*71*	
25.5.57			,,	*17*	*26*	*17*	*15*	*1*	*75*	*1957 Works Reports 72*
	27.5.59, J.2 Box	*3 Periods*								*85 per cent*
28.6.57			*J.2*	*17*	*26*	*13*	*15*		*71*	*Timekeeping 13*
28.7.57			,,	*17*	*22*	*13*	*15*		*67*	*2nd Year Group 2. £8*
29.8.57			,,	*17*	*22*	*13*	*15*		*67*	
28.9.57			,,	*20*	*26*	*17*	*18*	*1*	*81*	
16.10.57	*16.9.57, J.2 Corer*		,,	*17*	*30*	*17*	*15*		*79*	
8.11.37			,,	*17*	*30*	*17*	*18*	*2*	*82*	
30.11.57			,,	*20*	*26*	*17*	*15*		*78*	
9.12.57	*J.2 Sweeps*	*3 Periods*	*H. Taylor*	*17*	*26*	*13*	*15*		*71*	
9.1.58			,,	*17*	*26*	*13*	*15*		*71*	
10.2.58			,,	*17*	*30*	*17*	*18*		*82*	
28.2.58	*3.3.58, J.2 Closing*	*3 Periods*	,,	*17*	*30*	*17*	*15*	*1*	*79*	
29.3.58			,,	*17*	*30*	*17*	*18*	*1*	*82*	
27.4.58			,,	*17*	*30*	*17*	*18*		*82*	*1958 Works Reports 78*
25.5.58	*26.5.58, Furnaces*		,,	*17*	*30*	*17*	*18*		*82*	*91 per cent*
22.6.58			*P. Sanders*	*13*	*30*	*17*	*18*		*78*	*Timekeeping 13*
20.7.58			,,	*17*	*30*	*17*	*18*		*82*	*3rd Year, Group 1. £15*
17.8.58			,,	*17*	*30*	*17*	*18*		*82*	
14.9.58			,,	*17*	*30*	*17*	*18*		*82*	
12.10.58			,,	*17*	*30*	*17*	*18*		*82*	
9.11.58			,,	*17*	*30*	*17*	*18*		*82*	
7.12.58	*1.12.58. Lab.*	*6 Periods*		*17*	*30*	*17*	*18*		*82*	
4.1.59			*L. T. Hughes*	*17*	*26*	*13*	*18*		*74*	

KEY

1. **Knowledge of Job**
2. **The Way the Job is Done**
3. **Conduct and Behaviour.**
4. Personal Qualities, etc.
5. Timekeeping.

Final Remarks

In this illustration the apprentice is working on his own, putting the finishing touches to a mould before closing and casting is carried out.

Harry Gains Experience

In my three years as an apprentice at F. H. Lloyd's, I have worked in several of the moulding departments, the coremaking shops and service departments. I am now in the medium-size-box moulding section.

On reporting to my supervisor this morning, I was given a job—to make a roller blank—which would weigh 700 lb. When the pattern was brought to my "standing" (work place) the supervisor came and discussed the best way of making the mould—where the "heads" should be, how it should be run, where the joint should be made, and also giving me special instructions from the works' method's engineer—it was probably the biggest job I had tackled on my own so far.

I questioned him on the amount of tackle I should need, and then I was able to start—checking and measuring up the pattern. I ordered my moulding boxes, and the lifting bars and lifters I would want. Some special sand was delivered to my standing and I was able to start moulding.

The actual moulding was fairly straightforward, except for an area which was to be made in a highly-refractory sand, over which extra care had to be taken. (The Sandslinger certainly makes the filling up of a box this size quicker and easier). After strickling-off the box, a plate was clamped on and the box turned over—the joint was again quite straightforward—and, after bedding-in the guides, the top box-part was lowered on by crane, parting sand was applied, heads, runners and sleeves positioned and we began the top part, again using the special sand. After tying in the box bars and placing the lifters, I had to hand ram the lifters into place, the 'slinger again making short work of finish ramming this top part.

Whilst waiting for a crane lift to part my half moulds, I cleared up the standing. (It is surprising how much sand and tackle can accumulate around a job). Then I saw with amazement that it was already 4.30 p.m.—and I had to leave work early that evening to attend the local technical college—I am taking my Intermediate City and Guilds examination this year in Foundry Practice and Patternmaking.

After clamping on the external box-guides and marking up the top box, the top part was lifted off and turned over—luckily the top lifted very cleanly and not much patching-up was necessary. I only needed to "nail" the top face

Here the apprentice, supervised by a skilled moulder, is placing lifters in a complicated mould, prior to ramming the top section.

TABLE 2.—*Technical College Record of F. H. Lloyd Apprentice. (Reverse of Card Reproduced in Table I.)*

Year 1955-6. College—*County Technical College, Wednesbury*

Course.	Subject.	Report details.	Course result.	Award.
DM1 (B)	*Chemistry*	*2nd Class*	*2nd Class*	*£2*
	Physics	*2nd* ,,		
	Maths.	*1st* ,,		
	Eng. Drawing	*2nd* ,,		

Year 1956-7. College—*County Tech. College.*

Course.	Subject.	Report details.	Course result.	Award.
DM2 (C)	*Chemistry*	*2nd Class*	*2nd Class*	*£4*
	Intro. Metallurgy	*2nd* ,,		
	Physics	*2nd* ,,		
	General Metallurgy	*2nd* ,,		
	Maths.	*2nd* ,,		

Year 1957-8. College—*County Tech., Wed.*

Course.	Subject.	Report details.	Course result.	Award.
DM3 (E)	*Chemistry*	*2nd Class*	*2nd Class*	*£12*
	General Met.	*2nd* ,,		
	Physics	*2nd* ,,		
		Ordinary National Certificate Examination		

Year 1958-9. College—*County Technical College, Wednesbury*

Course.	Subject.	Report details.	Course result.	Award.
D4 M. (B)				

(Space for other years.)

and paint over the mould surface with a refractory wash. The time was 5.0 p.m.; my tools had to be cleaned and locked away.

A quick cycle ride home, a wash and change, and time for tea, left me just enough to check my books before leaving for technical college—hoping my homework was O.K.

Jim tackles Anything That Comes Along

My work in Methods Department at Lloyd's is primarily concerned with foundry tackle and equipment—I can never prophecy just what jobs I will be called upon to do. Calls for service can vary from the comparatively simple removal of an awkward pin from a bush, to the more complicated investigation needing the production of drawings and prototypes of equipment. However, my day is planned to a certain extent in a job list, this being a record of work on hand—completed jobs, jobs in progress and those awaiting attention.

This morning I had to check the progress on a

One of Lloyd's apprentices receiving instruction in foundry methods at the drawing board.

pair of patternplates for a new production order, which were being machined in the works' machine-shop; then there was a call to the machine-moulding shop to investigate a case of severe cross-jointing. The trouble was eventually traced to the actual locating bushes—new bushes are to be used to rectify this.

The next job on my list was an investigation as to the possibility of increasing the capacity of patternplates on a new mechanized moulding set-up. After observation of the set-up, and discussion with the supervisor, it appeared possible to increase the capacity, if some small electrical gear on the layout was re-located. While studying the machine drawings it was clear that, although this would do the job, a simpler and cheaper method could be devised.

After dinner, I assisted in an experiment to ascertain the performance of several types of exothermic materials. These we incorporated in various controlled moulds, which were later teemed in the foundry—the resultant castings to be cooled, cleaned and sectioned for micro-examination of their metal structure. Difficulty in the production of some small cores necessitated my next job. This was investigated and recommendations were made.

My last job was to accompany the methods superintendent on an investigation into a flaw in a certain section of an important casting. This was classified, and on his instruction I sketched a suitable modification for consideration.

APPENDIX

It is clear from the reports recorded here that apprentices within this group of steelfoundry companies are being fitted to help in moulding the *future of the industry.*

To assist other founders in formulating their own schemes of training, the basic curricula used by Lloyd's are reproduced in this appendix. Tables 1 and 2 show typical examples of how a trainee's progress is recorded. These records are not exhaustive, however, nor do they make references to many of the extra-mural activities—one of the latest of these being camping week-ends in Snowdonia, run much on the same lines as the "Outward Bound" schools.

Owners of small foundries would naturally find it difficult to emulate the comprehensive training schemes described, but for them participation in the Craft Training Centre arrangements or in local group activities can usually be made possible. Ironfounders are particularly well catered for in this respect.

In addition to the personal record-cards for apprentices, reproduced earlier, a planning board is maintained in the Training Centre (Bourne House) to record progress of each individual. At present about 110 young men are doing courses, the emphasis being, at the moment, rather more on the engineering than the foundry side. Apprenticeship schemes of this nature have been running at Lloyd's since 1947, and Bourne House itself was opened in 1953.

Works Training Area

The foundry training school is housed in the main works nearby. In the foundry itself a part of one of the moulding bays is reserved for intermediate training of apprentices. In the foundry school, an electric gantry crane of 3-tons capacity spans the training area, this being operated from a pendulum control. The floor is of concrete; molten metal can be brought in by a ladle carried on a bogie from one of the melting bays of the main foundry. To show the principle of operation, a moulding machine (a BMM pin-lift jolt/squeeze model) is available in the training foundry, along with compressed-air supplies and a gas-fired mould-drying stove. Sand supply is by dumper truck from the main foundry; bench core-making is also taught in the area, and moulds—either of green-sand or skin dried—for castings up to half-ton are prepared here by the trainees.

The training section of the foundry has been attractively decorated in a pleasing colour scheme and is heated by electric radiant-panel heaters. There are insulating panels fixed to the roof and some sound proofing has been arranged. The permanent staff of the school includes a full-time instructor who possesses a full technological certificate in foundry practice and patternmaking, and who has also passed through the special F. H. Lloyd supervisory training course (of 18 months' duration). It is interesting to record that a comprehensive system of monetary-prize incentives is in vogue at Lloyd's for apprentices, based on working and technical college records. These prizes, which may each go up to £50 in value, are distributed annually, merit being assessed on marks awarded.

It remains for the writer to record his thanks to

the directors and staff of F. H. Lloyd & Company, Limited, who made possible this account of their training facilities and provided illustrations.

FIRST YEAR.

(a) *Industrial Information Course.*

General industrial administration lectures, films and visits.

Factories Acts: Safety regulations—protective clothing, etc.; wage payment schemes; industrial health (including medical examinations).

Welfare Facilities: Paid attendance at technical college; organized physical education; organized indoor and outdoor sport; organized courses (national and local) in sport and recreational activities; protective clothing—overalls, safety shoes, goggles, etc.

Canteen Facilities: Meals and milk at reduced prices.

(b) *Foundry Training Curriculum (common to all foundry apprentices for the first two years).*

Basic Moulding: Moulder's tools and equipment and their uses; accident prevention in the workshops; use and care of pattern equipment; ramming, jointing and finishing of moulds; mould reinforcement (internal and external); venting and closing; moulding methods—including liftering; feeding and gating methods; use of chills and other aids to solidification; casting defects—causes and remedies, and mould drying.

Basic Coremaking: Core boxes; types of cores and their uses; venting; methods of locating cores (prints, chaplets, studs, etc.), and reinforcement.

Sand: Origins; basic properties; additions, and their effects; sand testing and control, and special sands.

Metal: Melting units; metal production (emphasis on "steel"); teeming; uses of fluxes; casting solidification, and temperature control.

Inspection and Testing: Quality control; testing (chemical and physical); special techniques (X-rays, ultrasonic and high- and low-temperature testing).

Technical College.

National Certificate and City and Guilds Certificate courses in foundry practice, patternmaking and metallurgy.

SECOND YEAR.

(a) *Practical Moulding and Coremaking.*

Medium-box moulding; foundry aids (Sandslingers, moulding machines, etc); medium coremaking; mould closing (including coring-up); sand testing and control.

(b) *Technical College.*

Intermediate certificate course for City & Guilds' Foundry Practice and Patternmaking.

• • • •

SPECIALIZATION FOR THIRD, FOURTH AND FIFTH YEARS.

(a) *Moulder and Coremaker.*

Third year.	*Fourth year.*	*Fifth year.*
Heavy-box moulding Sweep moulding Floor moulding Light coremaking Medium coremaking Heavy coremaking Closing and coring-up.	Continuation as third year.	Specialization. moulding, coremaking, closing.
Technical College. City & Guilds courses in Foundry Practice.	*Technical College.* Final City & Guilds Certificate in Foundry Practice.	

• • • •

(b) *Methods Engineer.*

Third Year.	*Fourth Year.*	*Fifth Year.*
Foundry services; research, and drawing office (methods).	Continuation as third year.	Specialization.

Technical College.

Final City & Guilds Certificates in Foundry Practice and Patternmaking.

(c) *Metallurgist.*

Third Year.	*Fourth Year.*	*Fifth Year.*
Routine chemical analysis Sand testing Furnace operation Foundry instruments Chemical research Physical testing. Special testing (ultrasonic, X-ray and high- and low-temperature testing).	Continuation as third year.	Specialization.
Technical College. Ordinary National Certificate in metallurgy.	*Technical College.* Higher National Certificate in metallurgy.	

★ ★ ★ ★

F. H. Lloyd's Gala Day

"Something for everybody, among employees, their wives, sons and daughters," might well have been the basic theme of the very successful horticultural show, sports and gala, staged by F. H. Lloyd & Company, Limited (steelfounders and engineers) last Saturday. Fine weather graced the occasion, though one received the impression that affairs would have gone well had it been wet—so large was the accommodation in the several marquees erected on the firm's sports ground at Wednesbury for the occasion. Sideshows, competitive sports, a variety performance, mannequin parade and a photographic section were among the dozens of hobbies, pastimes and recreations catered for. There was even a narrow-gauge railway ride for children, pulled by a model steam locomotive built by the apprentices. Although exhibits in the garden-produce section were numerically smaller than in previous years, the quality was good despite the dry, hot summer which has made an end-of-season show less rewarding than usual. From auction sales, entrance fees, etc., the whole series of events realized a considerable profit which as in previous years, will be devoted to charity. Winners in the works departmental events were the light fettling department. Mr. S. Berry (heavy fettling department) received the award for the highest number of points gained by an employee, and Mr. E. L. Stokes (light fettling) that for the second highest. Prizes were distributed by Mr. F. N. Lloyd.

Standard's sell Tractor Plant

Stockholders of the Standard Motor Company, Limited, have approved a board proposal to sell the tractor plant to Massey-Ferguson, Limited, for nearly £18,000,000. There was only one dissentient for a resolution recommending the sale of the tractor factory's capital assets for £14,900,000, plus about £2,750,000 for stock, work-in-progress, and spare parts, which was put to a crowded extra-ordinary meeting at Coventry recently.

The Standard company's cash resources are expected to be augmented by about £12,500,000, of which about £4,000,000 will be distributed, tax free, to ordinary stockholders as a distribution of 2s. 6d. per 5s. stock unit. The remainder will be used on the company's car expansion programme. The meeting also approved the change in the company's name to Standard-Triumph International, Limited.

Murex Extend Activities

Due to substantial extensions at the Waltham Cross Works by Murex, Limited, metallurgists, manufacturers of high-grade ferro-alloys, etc., of Rainham (Essex), expenditure is likely to continue at an annual rate of £500,000, states the chairman, Sir Arthur Smout. Provision is to be made at Waltham Cross for the manufacture and assembly of automatic welding machines as well as for the extension of present activities.

Present indications are that capital expenditure will be met from trading surpluses and the accommodation made available by the company's transfers which it has not up to the present been necessary to utilize.

The opening months of the current year showed some improvement in demand and the general tone is better than it was at this time last year. Group net profits of £334,034 compared with £291,650 and the dividend is cut 2½ per cent. to 15 per cent.

Company News

Qualcast, Limited, light repetition steel and iron founders and lawn-mower manufacturers, of Derby—There is to be a one-for-10 scrip issue to holders of September 28.

Brown Bros., Limited, stockholders of ferrous and non-ferrous metals, etc., of London, E.C.2—The 1959 interim dividend is being raised to 4½ (3½) per cent. The final for 1958 was 11½ per cent.

Craven Bros. (Manchester), Limited, machine-tool manufacturers, etc., of Reddish, near Stockport—The interim dividend is restored to 5 per cent. from the 3½ per cent. paid in 1958, when the total payment was 10 per cent., compared with 7½ per cent. in 1957.

North British Locomotive Company, Limited—There are no dividends on the 5 per cent. cumulative preference and 5 per cent. "A" cumulative preference stocks. Preference are in arrear from January 1, 1956; the "A" ranked for dividend as from January 1, 1959.

Smith & Wellstood, Limited, stove, range, and catering equipment manufacturers, of Bonnybridge (Stirlingshire)—Final dividend is 8 per cent., making 10½ (9) per cent. for the year ended June 30, 1959. Group net profit is £69,310 (£68,251), after tax of £61,351 (£76,520).

John Thompson, Limited, makers of boilers, nuclear-power plant, steel pressings, etc., of Wolverhampton—An interim of 7½ (10) per cent. is declared for 1959 on capital increased by the acquisition of Thompson Bros. (Bilston), Limited. Orders secured in the earlier part of the year were considerably below those for the same period of 1958. Welcome signs of an improving trend in orders may not affect the final results for 1959.

Modern Engineering Machine Tools, Limited—The dividend is effectively maintained at 24 per cent. with a 12 per cent. final for the year to March 31, 1959. The 1957-58 total included a special interim dividend of 8 per cent. A scrip issue of one 7½ per cent. preference £1 share for every 10 ordinary 5s. units is proposed. Trading profit rose to £182,542 (£119,986) and after tax of £75,531 (£60,960) the group net profit is £69,147 (£31,668).

F. W. Berk & Company, Limited, chemical manufacturers, etc., of London, W.1—The interim dividend is being raised to 3¾ ($2\frac{11}{12}$) per cent. on account of 1959. The directors state that although the results for the first half of the current year indicate that the year's profit will be higher than last year, the increase in the interim does not necessarily imply an increase in the final. The 1958 final of $7\frac{1}{12}$ per cent. made a total of 10 per cent. for the year.

Oxford & Cowley Ironworks, Limited—The company's share capital has been purchased by British Automatic Refrigerators, Limited, Rotherham (Yorks). Mr. Frank Clark, managing director, states that the financial backing of the new parent company will enable the ironworks to extend its present 4½-acre site at Cowley and introduce a wider range of constructional steelwork and welded fabrications. The new board will be headed by Sir Leonard Dyer, chairman of British Automatic Refrigerators.

Plastics Exhibition

A "Plastics 1959" Exhibition is being held in Düsseldorf from October 17 to 25, full details of which can be had from John E. Buck & Company, Limited, 47 Brewer Street, Piccadilly, London, W.1. The provisional list of exhibitors shows that about two dozen *British firms* have taken space.

Policy of W. G. Allen & Sons

Reduction in expenditure by the NCB, particularly during the current year from April 1, has been a serious matter for W. G. Allen & Sons (Tipton), Limited, colliery, light railway, and mechanical engineers, states the chairman, Mr. R. Hampshire. The company, however, continues to do a very substantial trade with the Coal Board and, while maintaining its position in the mining field, is following a policy of diversification of products and interests, both by the acquisition of subsidiaries in different fields and also by the development of new products by the parent company.

Trade in the engineering industry has been much more buoyant in recent months with many more inquiries so that a smaller order-book is much healthier than the 12 months' delivery which so often had to be quoted in the days of the sellers' market.

Trade investments rose from £2,206 to £82,206, the increase representing the investment in the ordinary shares of Brockhouse Allen (Pvt.), Limited, in Rhodesia. The bank overdraft has been reduced to £83,035 (£115,339). Group net profit is £58,160 (£52,525) and the dividend is raised 2½ per cent. to 15 per cent.

Associated British Engineering's Loss

Main reason for the adverse result reported by Associated British Engineering, Limited, holding company for a number of engineering concerns, is the continuation of the heavy losses incurred by a principal subsidiary in the automotive and industrial division. Although the marine division has earned and is expected to continue to earn reasonable profits during the current year no improvement in the group's consolidated earnings can be foreseen until the losses referred to have been overcome. The group's project for the manufacture of free piston gasifyers for land and marine use is not at the present time producing orders on the scale originally envisaged.

In the year ended March 31, 1959, a trading deficit of £11,406 was incurred, against a previous surplus of £282,475 and there is no dividend on the £1,100,000 ordinary shares. For the previous year there was a 2½ per cent. interim but no final payment. The group net loss is £99,251 (profit of £30,227).

Wellman Smith Owen's Outlook

Capital expenditure programme, amounting in the last four years to about £1,000,000, has enabled the Wellman Smith Owen Engineering Corporation, Limited, London, S.W.1, to shorten delivery periods materially, states the chairman, Sir Peter Roberts, in his annual review. The company has a substantial order-book, work in progress, after £6,274,910 (£4,411,245) received, having increased from £426,996 to £963,169 at March 31, 1959.

There is a large volume of business in prospect from the iron and steel industry and contracts in hand extend well into 1961. Trading profit expanded from £890,269 to £1,398,208, reflecting record turnover and expansion of the business. The net profit rose to £633,471 (£396,395) and the dividend is effectively doubled at 25 per cent.

Powell Duffryn Carbon Products, Limited—Mr. F. W. Stokes has been appointed to the board. He joined the company in 1951 and was appointed works manager in 1954.

tute of Indian Foundrymen

Annual General Meeting Report

inth annual general meeting of the Institute n Foundrymen was inaugurated by the hon. waran Singh, Union Minister for Steel, Mines Government of India at the India Exchange alcutta, in July, when Dr. B. R. Nijhawan, I.M., F.N.I., director, National Metallurgical ry and the president-elect of the year was into office. More than 150 members attended ting at which were considered the immediate be taken to promote the foundry industry ontext of Government of India's current plans duction targets. The function was followed Institute's annual dinner at the Great Eastern vhich was attended by a record number of s and guests. The hon. Sardar Swaran Singh guest of honour at the dinner.

ıs presidential address, Dr. B. R. Nijhawan l the members of the Institute for having him the president of the Institute, and assured hat he would do his utmost to further the of the Institute.

ning briefly the role of the Institute, Dr. an said that he was proud of the diverse es of the Institute since its inception in 1951 s election as a member of the International ttee of the Foundry Technical Association, the Asia to be affiliated to that international body. ter interest and to promote research and devel- t in foundry technology by original technical utions from industry, research laboratories and sities, Dr. Nijhawan announced the institution of wards in gold medals and cash prizes, for out- ıg contributions in various fields of foundry logy.

cope up with the multifarious expansion of the te's activities, Dr. Nijhawan announced that were being taken to open chapters at important rial centres in India, so that the foundrymen r the country could have a forum for the presen- of technical results, views and opinion, and ssist in development work on foundry problems.

Indian Foundry Industry

reying the present position of the foundry ry in India and its future plans for expansion, ijhawan stated that in the light of the develop- that had taken place in the world in all phases ındry technology, considerable scope existed for owth and development of Indian foundries by ng the latest techniques. The technical data ed by systematic investigations undertaken by ıtional Metallurgical Laboratory on the indigen- oulding materials, Dr. Nijhawan hoped, would long way in meeting the requirements of the y industry. Such investigations conducted by aboratory, Dr. Nijhawan added, had already the way for the introduction of sand-control ıs into Indian foundries and a number of n plants, such as that of the Tata Locomotive gineering Company, had already set up units gid scientific and sand-testing control and also ıe reclamation of foundry sands.

ı a view to assisting small, medium, and large- foundries, the president announced that the committee of the Council of Scientific and rial Research, under the chairmanship of Sir Ghandy, chairman of the Executive Council of ational Metallurgical Laboratory and director-in- of Tata Industries, Limited, had proposed to establish co-operative foundry research centres in selected areas in India. These foundry research stations would undertake short- and long-term problems, and impart technical "know-how" on the latest developments for increasing productivity and ensure economy and efficient operation for improving the quality of the products. The establishment of a training institute, Dr. Nijhawan said, would be necessary and in this connection he commended the proposal of All India Technical Education to establish an Indian Foundry College along the lines of the National Foundry College of Wolverhampton. He hoped that it would be possible in the near future to provide the industry with technical personnel, trained on scientific lines, for taking up higher executive, operational and managerial positions to cope with the rapid technical advances made all over the world.

Concluding his address, the president assured the Institute of his fullest co-operation and that of the National Metallurgical Laboratory in the pursuit of the objectives of this young but dynamic Institute. With the co-operation of members, he hoped that the Institute of Indian Foundrymen would continue to expand its activities and would acquire a stature at par with identical institutes in other advanced countries of the world.

Briefly reviewing the activities of the Institute, the retiring president, Mr. N. G. Chakrabarti, works manager, foundry division, Tata Locomotive & Engineering Company, said that the untiring effort of the Institute had resulted in starting a foundrymen's training centre at the Indian Institute of Technology, Kharagpur, in collaboration with the Ministry of Commerce and Industry, and the Ministry of Education and Technical Co-operation Mission in India. He said that over 100 foundry operatives had been trained already and were giving useful services to their respective foundries. He expressed the hope that, those trained in the Institute, would be able to contribute their part in the ever-expanding foundry industry in the country which, he was sure, would also have great scope in future.

School-leavers account for Rise in Unemployed

Young people leaving school accounted entirely for the rise in the number of unemployed by 32,000 to 427,000 between July 13 and August 17. Adult unemployment fell by 6,000. For the first time since February the number of unfilled vacancies declined. At 263,000 it was 12,000 lower than in July—though there was a fall of exactly the same dimensions in the same month of last year and the grand total is now over 60,000 higher than it was then.

The national percentage rose from 1.8 on July 13 to 2.0 on August 17. Regional percentages were lower than the national figure in London and the south-east (1.1), eastern and southern (1.3), south-western (1.7), Midland (1.5), north Midland (1.5), and East and West Ridings (1.7). Higher-than-national percentages were recorded in the following regions:—North-western (2.5), northern (3.1), Wales (3.4), and Scotland (3.9). Scotland was the only region which showed a fall in unemployment.

Mr. P. Warden, a former manager of the drawing offices of the British Thomson-Houston Company, Limited, at Rugby and Coventry, has died at the age of 71. He had been associated with the firm since 1902.

Equipment & Supplies

Micro-hardness Tester

Nash & Thompson, Limited, Chessington, Surrey, England (Elmbridge 5252), announce that they have concluded arrangements for the marketing of the G.K.N. micro-hardness tester, manufactured by Associated Automation, Limited, Dudden Hill Lane, London, N.W.10 This precision measuring instrument, which was developed by Associated Automation, Limited, and the Guest, Keen & Nettlefold research laboratories, enables indentations to be spaced less than 0.001-in. apart. Small sections, foils and individual crystals or phases can all be examined. Using a 10-gram load on a material with a hardness of 200 V.P.N. the diagonal dimension of the indentation is only approximately 10 microns. The micro-hardness tester can be supplied mounted to, and calibrated with, a suitable bench-type metallurgical microscope.

Cupola-blast Indicator and Controller

John Thompson Instrument Company, Limited, Ettingshall, Wolverhampton, are marketing a new cupola-blast indicator. This instrument is for the measurement of air pressure and air flow, and gives immediate warning of any divergence from normal, such as bridging, or too-deep or too-shallow a coke bed. The standard instrument (see Fig. 1) has a graduated circular scale of 20 in. effective length, with two pointers. The centre pointer indicates the air flow in cub. ft. per min., and the outer one shows air-pressure supply in the wind belt. It is housed in an aluminium casing to British Standard recommendations, and is of the flush-mounting type, being dust-proof and easily installed in a position suitable for observation by the cupola operator.

Optional Extras

There are a number of optional additions available for the basic instrument, one being an automatic damper control which regulates the oxygen feed to provide complete combustion at optimum conditions. Another extra is a blow-down attachment, which is put into operation by push-button after the last charge has been made. A third addition is an instrument for providing permanent records of each run, in which there is a two-pen recorder (see Fig. 1 (left)) which plots a complete record of air pressure and air measurement throughout the blow.

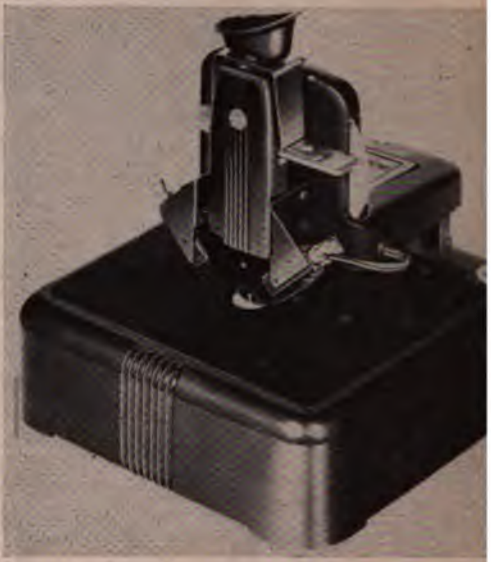
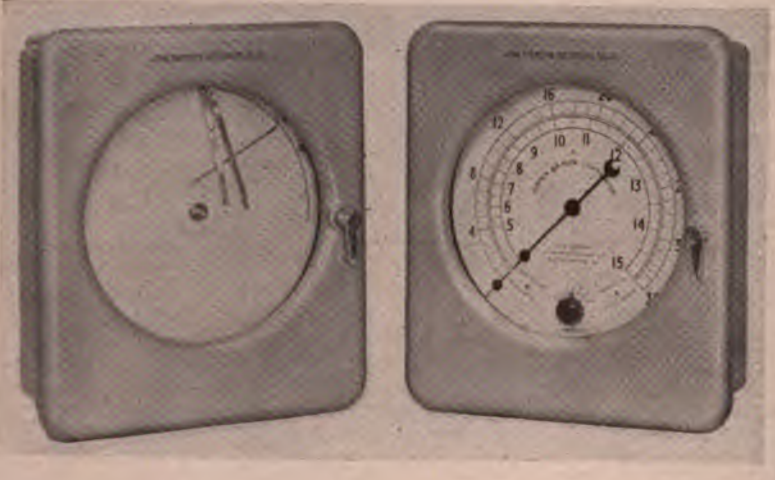


FIG. 2.—*Reflection-transmission colour d*
meter, introduced by Kodak, Limited, of L

Colour Densitometer

Kodak, Limited, Kingsway, London, W.C.2
introduced a new reflection-transmission colour
meter (Fig. 2), which is designed for reading
transmission or reflection densities. Apart fr
use in colour photography, the densitometer is r
to be useful in black-and-white work, where it
used in the following ways: to determine the
range of prints, transparencies and negatives;
termine the paper grade to match the negative; t
exposure and development times; to help in pr
enlarging or contact-printing times; to chec
factors; to help in the preparation of time-
tables, and to check the activity of developing
It can also be used in density measurements o
tion monitoring films, control strips for X-r
automatic processing units, and radiographs
wedges.



Pressure Indicator

The latest addition to th
of diesel-engine service equ
manufactured by the D
Engineering Company, L
73/75, Mortimer Street, L
W.1, is an instrument ca
Diesindicator. It has
designed to register accura
and initial cylinder pressure
a clear dial-type gauge, an
vides immediate visual r

FIG. 1.—*Two models*
cupola-blast indicator a
corder now being marke
John Thompson Inst
Company, Limited, of W
hampton.

ut the need for making complicated adjustments
e or during use. It is suitable for diesel engines
speeds where access to the combustion chamber
vided; it is applied simply and quickly and can
ed either in vertical or horizontal positions. The
dicator is supplied in a polished wooden instru-
case, complete with male and female connectors
andard compression cocks, special spanners and
, and cleaning wires required for servicing the
cartridge.

or Die-casting

orting on the merits of towns' gas as a fuel for
sting purposes, the Gas Council, from 1, Gros-
Place, London, S.W.1, has submitted the follow-
ccount of the operations of a London firm—
. Developments, Limited. This firm, which was
d in 1945 with a small factory and a labour
th of six, now has 120 employees working in a
y of 20,000 sq. ft. The growth of the firm reflects
rowth of the diecasting industry in Britain since
re-war years. For example, the firm has increased
rnover almost threefold in the last five years, and
y there is variety in plenty of production at the
s in Tottenham. Among the larger zinc-base
ure-die-cast components made are headlamp bezels
he Ford Motor Company—these are of a compli-
design, and have to be eventually chromium-
d. To avoid rejects, it is essential that the surface
ty of the die-castings be of a very high order.
urettor parts afford examples of a complex die-
ng technique where the process has minimized
ining and drilling costs to a considerable extent.
he other end of the scale are cases for ladies'
hes, weighing only a few grams, and amongst
r items are gold-plated zinc-base die-castings for
ric shavers, components for the electrical and
industries, and washing-machine components.

roach to Automation

me of the die-casting machines employed are
ufacturers' standard models (Fig. 3); others have
built or modified by the firm themselves for their
use to meet special conditions or different con-
s. The basic process of pressure-die-casting is well
vn—with zinc-base alloys, the metal is melted in a
ace and pumped under high pressure into a steel
which forms the component to the shape of the die.
valves open and close the die whilst operating the
p in a sequence, so that the whole process takes
on a controlled temperature/time schedule. Such
ines are built for relatively large, complicated
stings. On the other hand, when it comes to long
of relatively small die-castings, a nearer approach
utomation is desirable. For this the firm decided
uild a number of completely automatic machines.
designed an electronic timer which, by operating
air valves automatically, opened the die-halves,
d them, allowed molten metal to flow into the
y, then opened them again and ejected the casting
out any action by the operator. A counting
anism on the electronic timer told the operative
sely how many components had been turned out.

rol

e firm use gas for die-casting—first because of its
enience and second because of its reliability. "It
means that we have a quite simple form of
ng," states Mr. M. C. Aldridge, who is one of
hree partners who started the business, and who is
secretary and director. "From a meter reading
an keep a close check on the fuel cost per unit
output. And, of course, we know monthly or
ly fuel figures without having to attempt to determine how much solid fuel there is in a heap in the yard, or how much liquid fuel there is in a tank." The firm not only specializes in zinc-base die-castings, they also make considerable quantities of pressure-die-cast aluminium-alloy castings. The process here is somewhat different, the aluminium alloy being separately heated in non-metallic crucibles, again on pyrometer control principles, and then ladled in the molten state into the die-casting machines.

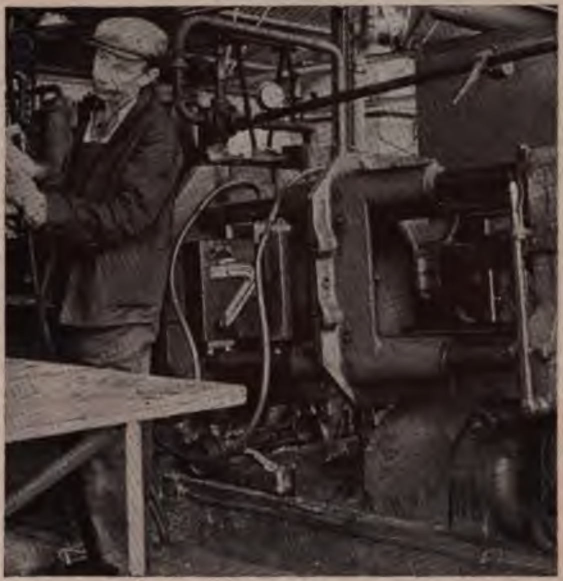


FIG. 3.—*Die-casting machine in the "dies-open" position, showing the die cavity—at the works of T.A.L. Developments, Limited.*

METALIFE GROUP OF COMPANIES, Station Square, Harrogate, announce a recent addition, "Metalife 1000," to their range of rust-proofing and corrosion-resisting liquid metals for the protection of iron and steel. It is claimed that this coating will withstand temperatures up to 535 deg. C. A possible use suggested by the makers is the coating of cupolas and ovens.

WITH A RECENT ORDER for two 5,000 cub. ft. per hr. nitrogen plants, the gas atmospheres division of the Incandescent Heat Company, Limited, Smethwick, Birmingham, has now installed or has on order 50 nitrogen plants with capacities ranging from 500 to 32,000 cub. ft. per hr. at NTP. The majority of these plants are packaged units and can be transported in one piece. These plants all depend on the combustion of gaseous or liquid fuel with air so that atmospheric oxygen is converted to CO_2 and H_2O. The water is removed by cooling, refrigeration and desiccant drying, whilst scrubbing with monoethanolamine removes CO_2. Complete removal of H_2, CO_2 and O_2 is accomplished by a unique process which depends upon the use of a special catalyst. Another feature claimed for these generators is a high degree of flexibility, since the flow of amine, fuel gas and air are all related to the demand for nitrogen. It is reported that the resultant nitrogen has a purity equivalent to that obtained by any other method.

Nucleation of Grey Iron

"Some Methods of reducing the Degree of Nucleation of a Grey Cast Iron in Relation to Sinking under Bosses on Thin Plates" is the title of a Research Report (No. 512) contained in the June issue of the British Cast Iron Research Association's *Journal of Research and Development*. The author, Mr. A. G. Fuller, B.SC., states that experiments carried out in this work show that sinking and the degree of nucleation of a grey cast iron may be reduced by the following processes:—(1) Bubbling oxygen through the furnace for two minutes; (2) poling with a green pole; (3) holding the molten metal in the furnace at temperature and (4) additions to the furnace of titanium with or without subsequent bubbling with carbon dioxide.

In his introduction to the Report, the author states that repeated observations have shown that the depth of sinking under bosses on thin plates is related to the number of eutectic cells growing. One of the most important factors controlling the number of eutectic cells growing is the degree of nucleation of the iron. The purpose of the investigation was to investigate processes by which the degree of nucleation may be reduced, since, due to the fact that the degree of nucleation of a cupola melted iron may vary widely during the course of a day, it may be desirable to maintain some control over this variable. In this investigation no attempt was made to demonstrate methods by which the degree of nucleation may be increased, since inoculation is the most suitable process and its effect on decreasing soundness and increasing the degree of nucleation has previously been demonstrated.

Conclusions from Tests

A number of tests were carried out by casting $\frac{5}{16}$-in. plates measuring 9 by 6 in. from metal melted in a high-frequency furnace, and cast into green-sand moulds based on Broomsgrove red sand carrying six per cent. superfine coal-dust and five per cent. moisture. The author gives his views on the tests in the following statement:—

From previous experience it has been found that the degree of nucleation and the shrinkage characteristics of a cupola melted iron are greater than of irons melted in a high-frequency induction furnace. For this reason, throughout the series of experiments described in the paper, the metal was inoculated prior to any treatment, in order to make it more representative of cupola melted iron, since the object of this experiment was to investigate some of the methods available for reducing the degree of nucleation of an iron in a commercial foundry.

Due to limitations upon the equipment available in the laboratory, the effect of holding time on reducing the degree of nucleation was assessed by holding the metal in the high-frequency melting furnace. This is not likely to be practicable in a commercial foundry, particularly where the metal is melted in a cupola, but experience has shown that the degree of nucleation may also be reduced by holding the metal in a receiver, bull ladle, or even in the casting ladle, provided that the temperature fall during the holding period is not too great.

The success of the gas-bubbling treatments and of poling in reducing the degree of nucleation is believed to be due to their effect in causing turbulence in the metal. Although bubbling oxygen through the metal and poling with a green pole are employed in some sections of the industry as methods for increasing the chilling characteristics of the iron, it is believed that *in practice any method of causing* turbulence will be satisfactory and that in most foundries compressed air is likely to be the most readily available means. The next stage of this investigation will preferably be the examination of these methods in a foundry, in which it is desired to obtain some form of control of the degree of nucleation, but in the meantime further laboratory experiments will be carried out using compressed air.

In all of the experiments in which gases have been bubbled through the molten metal, refractory lances have been used, since in preliminary experiments when using both graphite and refractory lances it was observed that whereas bubbling with oxygen through a graphite lance increased both sinking and the degree of nucleation of the iron, reverse effects were obtained if a refractory lance was used.

In applying in the foundry any of the processes described in the paper it must be remembered that while a decrease in the degree of nucleation of the iron will improve the soundness of light-sectioned grey-iron castings, a number of side effects may occur, for example, a reduction in the mechanical properties of the iron, an increase in the chilling tendency of the iron, and the occurrence of phosphide or other exudation defects upon the casting. The side effects may in certain circumstances be undesirable and in these circumstances deliberate reductions in the degree of nucleation should be carried out only under closely controlled conditions.

Edgar Allen oppose Steel Nationalization

On the subject of nationalization of the steel industry, Mr. W. H. Higginbotham, chairman of Edgar Allen & Company, Limited, Sheffield steelmakers, in his annual review states: "We can only hope that the general public will be wise and well informed enough in due time, to reject such a policy decisively. Meanwhile, your directors feel it to be their duty, in your interests, to oppose it by every legal and practicable means."

The general picture is one of recovery and progress, the chairman says, and though the board reports signs of improvement in demand, it is unlikely to come quickly enough to benefit the current year very materially. Group net profit contracted to £258,880 (£375,746) and the dividend is maintained at 12½ per cent.

Newton Chambers and the Master Cutler

MR. P. J. C. BOVILL, B.SC., who has been elected the 324th Master Cutler, is managing director of Newton Chambers & Company, Limited, Thorncliffe, Sheffield, ironfounders and engineers. He is also a director of Ransomes & Rapier, Limited, of Ipswich, and Wellman Smith Owen Engineering Corporation, Limited, Darlaston. He is a member of the Court of Governors of Sheffield University, a member of the council of Sheffield Chamber of Commerce, and a vice-president and past-president of the National Trades Technical Societies. It is interesting to note that Newton Chambers have a unique record of Masters of the ancient Company of Cutlers in Hallamshire. Three members of the present board of directors are past Master Cutlers—the chairman, Sir Peter Roberts, BT., M.P. (1956); Col. J. P. Hunt (1948); and Lord Riverdale (1946). In addition, Sir Harold West, former managing director, was Master in 1952; and the late Sir Samuel Roberts, BT., a former chairman, was Master Cutler in 1935.

Notes from the Branches

South Africa

A paper entitled "Pyrometry—The Science of High Temperature Measurement" presented by Mr. [illegible] Robinson, launched the general meetings for the new presidential year of the South African branch of the Institute of British Foundrymen under the chairmanship of Mr. K. B. [illegible]. The author introduced his lecture by informing members that pyrometry had been defined by the Association of Scientific Apparatus Manufacturers as the art of temperature measurement above 500 deg. C. He also stated that it is doubtful if the immense development in melting, casting and wrought fabrication of iron and steel would have been possible were it not for the improvements in the methods of measuring hot-steel temperatures, both molten and solid. The basic principles of the various types of pyrometers were broadly classified into resistance thermometers, thermocouples, partial-radiation and total-radiation pyrometers.

Resistance Thermometer

The resistance thermometer is generally only used for accurate research work, although it can be used in industry for the measurement of temperatures below 600 deg. C. This type of thermometer gives the greatest accuracy of all secondary instruments, but is extremely delicate and bulky, and for these reasons is not used extensively in industrial applications. One possible use is for furnace-temperature measurements in low-temperature annealing operations.

Thermo-electric Pyrometry

A thermocouple pyrometer consists of three main elements:

(*a*) The thermocouple, comprising two dissimilar metals, usually wires, electrical insulation, and usually a protection tube.

(*b*) Lead wires to connect the thermocouple and the instrument.

(*c*) An e.m.f.-measuring instrument, usually a potentiometer or millivoltmeter.

The copper/constantan (45 per cent. nickel, 55 per cent. copper) and iron/constantan couples have been developed for low-temperature work in the sub-zero to 500 deg. C. range. Chromel (90 per cent. nickel, 10 per cent. chromium)/Alumel (94 per cent. nickel, 2 per cent. aluminium, 3 per cent. manganese, 1 per cent. silicon) thermocouples have a straight temperature/e.m.f. curve up to near the maximum of 1,300 deg. C. Since this combination of alloys can be used continuously up to 1,110 deg. C., and are very cheap, they are extensively used for recording the temperatures of heat-treatment furnaces.

Quick Immersion Thermocouple

The Q.I.T. consists of a Pt./Pt.-Rh. thermocouple protected by a vitreous silica sheath of such thickness as to withstand the pressure of the liquid metal, but thin enough to allow the hot junction of the couple to attain the temperature of the bath in a few seconds. Reliable routine measurements of temperatures of the order of 1,600 deg. C. can be made with this unit. The silica sheaths should be renewed after each immersion, and after 10 to 12 readings an inch or so of the thermocouple wires should be removed and a new hot junction made. The quick-immersion thermocouple is extensively used in the iron and steel industry.

Total-radiation Pyrometer

In the total radiation type of pyrometer a concave mirror concentrates a portion of the radiation from the hot body on to a sensitive element, which has a blackened receiving surface. This receiving element is generally a sensitive thermocouple and the resultant e.m.f. may be measured by means of a millivoltmeter. Both these types are self-indicating instruments and in general use, the latter being used extensively for roof-temperature measurement of open-hearth furnaces.

Optical Pyrometer

The optical pyrometer is a partial-radiation pyrometer, and may be regarded as an instrument designed to improve the visual estimates of temperature by providing the eye with a lamp filament. This filament is connected in series with a battery, rheostat and milliammeter. By varying the current through the filament it may be made to match in brightness the image of the hot body.

Discussion and Vote of Thanks

The discussion was opened with a contribution by Mr. E. Beaver, who discussed the care and maintenance of pyrometric equipment. He emphasised that common-sense, care, and simple routine checks would be well rewarded in maintaining a high degree of accuracy, reliability and usefulness from all pyrometric equipment. The vote of thanks was proposed by Mr. [illegible], who said that the paper had been a valuable contribution to the branch's knowledge of this important subject, and that he found the discussion most refreshing. The vote of thanks was acclaimed with cordiality.

New Catalogues

Ventilation. Two catalogues have been received from Templewood Hawksley—a member of the Hawker Siddeley group—2, Buckingham Avenue, Slough, Bucks. The first deals with roof-slope aluminium cowl-type extractors. Aluminium, it is stated, is to be preferred to steel for this duty owing to its superior corrosion resistance, but steel units carrying a protective coating can be supplied, to suit any specific conditions for which aluminium is not suitable. The catalogue carries some quite interesting calculations of the number of units required to change the atmosphere of a building six times per hour. The second catalogue covers power-operated roofing shutters (details of these were given in the JOURNAL, January 29 issue, page 127).

Epoxy-resin Adhesives. Ciba (A.R.L.), Limited, Duxford, Cambridge, have recently issued a very useful folder on how to use Araldite epoxy-resin adhesives. It takes the form of two charts, the first of which lists the materials to be joined and about 16 types of adhesives and then indicates the results to be expected from their application. The second chart details comparisons of these adhesives and some useful practical hints are also given as to their applications.

Blast-furnace Linings. In Publication No. 110, General Refractories, Limited, Genefax House, Sheffield 10, have made good use of colour printing to stress the company's recommendations as to the type of refractory to be used in all parts of blast furnaces and hot-blast stoves.

Pointers from Japan

Research by a Tokyo University

The Castings Research Laboratory of Waseda University, Tokyo, Japan, have issued a report (No. 9) which contains a number of very interesting observations. Some of these are summarized in what follows.

In a paper on the "Influence of Vacuum Melting on the Structure and Mechanical Properties of Cast-iron" by Dr. I. Iitaka and M. Kiruchi, it is shown that the various treatments, such as atmospheric melting and casting in vacuum; melting in vacuum and casting in atmosphere; melting and casting in vacuum; melting in vacuum and casting in nitrogen, and vacuum-melting and casting in argon, all progressively increase the tensile strength of the iron, and finally doubling it as compared with normal practice. The reaction austenite→graphite + ferrite was found to be promoted by vacuum-melting, and massive graphite to be separated out by vacuum-melting.

Dr. N. Kayama, T. Ishino and K. Saito in a paper on the "Effect of Moisture on Molten Cast-iron," describe the results of tests on the blowing of air on iron heated to 1,000 deg. C., and on molten iron at 1,400 deg. C. It was found that the considerable oxidation noted in the former case was inappreciable in the second. The authors deduced that the major adverse effect in cupola practice took place before actual fusion. They suggest that, due to the moisture in the coke and furnace lining (which is additional to the atmospheric moisture), the water content in cupola practice is actually higher than usually suspected, and that increased chilling and shrinkage cavities therefore result.

Experiments using both a small cupola and an electric furnace are described in a paper, by Dr. I. Iitaka and K. Nakamura, covering the various properties of high-duty cast-iron consequent upon an oxygen blow. The results yielded show only a slight improvement on those given by using steel scrap additions, all melts being inoculated with a 0.3 per cent. calcium silicide addition.

In a paper from T. Kusakawa, dealing with s.-g iron, examination is made of the fundamental properties of calcium, magnesium and cerium. It is recommended that calcium and cerium be used as a combined addition.

Non-ferrous Papers

"Melt Quality and Fracture Characteristics of 85/5/5/5 Red Brass" is the subject of a report by S. Oya and U. Honma, where an attempt was made to establish more quantitative correlations between gas pick-up and fracture characteristics. It appears from these studies that "little gas pick-up can occur by water vapour bubbling through the 85/5/5/5 melt without any deoxidizer, but marked pick-up can be expected from water-vapour bubbling or exposing, following an excess addition of phosphor copper. Fracture characteristics of the chilled blocks are susceptible to gas pick-up in the melt. Less depths of columnar (structure), blue-grey patterns, and coarser texture are formed in the fractures from high gas-content melts. When the gaseous melt is settled (held) for 10 min. or more, dissolved gas in the melt attains equilibrium."

These two authors carried out a similar research on "Gases in Aluminium-bronzes." The alloy used was 87-per cent. copper; 10-per cent. aluminium and 3-per cent. iron. There was very little gas pick-up after bubbling of water vapour, prolonged stewing and excessive heating of the melt. Serious gas pick-up occurred after a 0.2-per cent. Ca addition to the melt followed by steam bubbling. High casting temperature can influence density and porosity, as also can prolonged holding time after gas pick-up.

(Continued at foot of Col. 2)

Dr. J. Kashima and H. Miyasaka, in a paper on the "High-temperature Properties of CO_2 Sand" detail the effects of ten different additions on the compression strength and deformation of the sand, at temperatures ranging from room to 1,400 deg. C. The additions included: coal-tar pitch, Gilsonite, asphalt emulsion, wood-flour and bentonite.

Presentation to C. S. Whitfield

Following the appointment recently of Mr. C. S. Whitfield as foundry manager of Stanton Ironworks', Holwell Works, Melton Mowbray, he was made the recipient of presentations from the management and employees at Stanton's Riddings Works, where he was previously superintendent. The illustration shows Mr. Whitfield (right) at an evening function receiving a silver cigarette case from Mr. T. K. Brook (office manager at Riddings), who made the presentation on behalf of his colleagues. (The transistor receiver, gift of Riddings employees, is shown in the foreground).

Zirconium Sponge Import Duty Exemption

The Board of Trade give notice that they are considering an application for the exemption from import duty of zirconium sponge. A statement of the applicants' case will be made available to all interested parties who wish to make representations in the matter if they are prepared to give an undertaking to treat the information contained therein as strictly confidential and to allow their comments to be passed to the applicants for reply. Requests for a statement of the case, together with an undertaking in the terms set out above, should be addressed in writing to the Board of Trade, Tariff Division, Horse Guards Avenue, London, S.W.1, not later than September 21.

leby-Frodingham Record

result of further technical progress, signifiievements in the production of steel during are reported by the Appleby-Frodingham mpany (branch of the United Steel Comimited), Scunthorpe (Lincs). The company's melting shops had a record output of 116,518 teel during the four weeks ended August 29. eds by nearly 12,000 tons the previous best ks' output of 16 months ago.

d in the new output figure was the addiduction record of the Appleby melting shop, one made 74,437 tons of steel. Its previous r-week total was 70,383 tons achieved in r, 1957.

the past four weeks the second open-hearth which has been converted to the "Ajax" rocess, stepped up output to 14,495 tons, an of 1,319 tons on the previous four weeks.

ocess at Scunthorpe was designed by Applebyam to give substantially higher outputs from open-hearth furnaces without incurring a pital expenditure.

mstrong Whitworth Pumps in Venezuela

umps shown in the accompanying illustration -shore station, are being used for pumping oil enezuelan lake. They have been manufactured strong Whitworth (Metal Industries), Limited, Oil Well Supply Company, Limited, and are 40-h.p. Oilwell-type 612-P, with a capacity of

ll. per hr. at 35 r.p.m. Shell Venezuela have urchased 100 of these pumps, and 70 of them alled in the "block" units. Great care was in the manufacture of the high-duty cast-iron used, as they have to withstand 3,000 lb. n. pressures. Ultrasonic, gamma-ray and other ructive tests were applied during manufacture.

Safety Abstracts

Volume 3 number 32 of *Industrial Safety Abstracts*, compiled by the Institution of Industrial Safety Officers (52 Grosvenor Gardens, London, S.W.1), and published by the Royal Society for the Prevention of Accidents, contains several of interest to founders. For example, the abstract from "Problem of Rheumatism in Industry" reveals that among workers in metal manufacture, engineering and allied trades, the incidence of rheumatic diseases is below average: workers in mines and quarries top the list. Another, referring to "Health Problems of Epoxy Resins" contains the statement that experince has shown that it is now possible to avoid or reduce the health hazards of these materials by efficient factory techniques, and a list of 12 precautionary measures is quoted. These are:—

1. Instruction and education of all staff.
2. Only limited quantities of materials, particularly solvents, must be made available from stores. In practice this should be restricted to that amount necessary for the shift or at most for the day's work.
3. The routine technique should be adopted so that one complete cycle of operation takes place, *i.e.*, weighing, mixing and de-aerating, pouring, stoving.
4. Mixing and de-aerating should take place in well-ventilated chambers under cowling or in fume cupboards. Extraction fans must discharge to the outside air. Hot processes should be housed in a special unit, Where exhaust ventilation is not possible, fans of reasonable size should be installed to blow air away from the operator.
5. No smoking or consumption of food at work.
6. Benches should have easily cleaned surfaces or covers which can be changed when soiled.
7. For the cold- or air-cure process, work should be stored in well-ventilated chambers where restricted entry can be maintained.
8. Paper cups which are frequently used to mix resins must be disposed of to avoid further contamination, and are best destroyed by incineration outside the works.
9. Full advantage must be taken of industrial hygiene:
   (*a*) Suitable barrier-creams must be provided at the work bench and used regularly;
   (*b*) Resin-removing cream must be available at the work bench with a supply of clean rag or paper towels;
   (*c*) Protective clothing should be used and face-masks if powders are used. Sleeveless overalls avoid impregnation of cuffs;
   (*d*) Good washing facilities must be available on site.
10. Pre-employment selection of workers to exclude those with a history of chronic skin disease, allergy and asthma.
11. All skin involvements and injuries should be reported immediately.
12. Thorough cleansing of the hands before using lavatories.

The publication also contains abstracts of papers on such subjects as "Occupational Causes of Lung Cancer"; "Healthy Floor Coatings"; "Are Safety Campaigns Effective" and "Foundry Goggles"— the latter, of course, referring to the second report on this subject appearing in this JOURNAL last May.

ALFRED HERBERT, LIMITED—Sir Halford Reddish, chairman and managing director of the Rugby Portland Cement Company, Limited, and a director of the Hawker Siddeley Group, Limited, has been appointed a director. He will act in a consultative capacity.

Personal

Midland Silicones, Limited, announce that Mr. R. J. Newton has been appointed textile marketing manager.

Mr. T. Furness, secretary and a director of Thomas Robinson & Son, Limited, woodworking engineers, has been appointed a managing director.

Mr. John P. Elliott, F.I.C.S., secretary and a director of Davey, Paxman & Company, Limited, engineers, Standard Ironworks, Colchester, has been appointed assistant managing director.

Mr. I. Levin and Mr. A. L. Wolley have been elected directors of the General Steel & Iron Company, Limited, Hayes, Middlesex, and of G. R. Turton, Limited, engineers, Vulcan Ironworks, Nottingham.

Mr. J. C. Spark, works manager of the locomotive works of Eastern Region, British Railways, at Doncaster, has been appointed works manager in charge of the combined locomotive, carriage and wagon works there.

After an interval of 25 years, Mr. Andrew Hamilton has rejoined the Paisley firm of Thomas Lamont & Company, marine-pump manufacturers, and will be responsible for their interests on the English north-east coast.

Mr. T. Walker, formerly secretary of J. Haigh & Sons, Priestroyd Ironworks, Huddersfield, celebrated his golden wedding on September 4. Aged 77, Mr. Walker retired at the age of 70, having been secretary of the company for 37 years.

Sir Peter Roberts, chairman of Newton Chambers & Company, Limited, of Sheffield, will be guest of honour at the opening session of this year's Gas Sales & Service Conference, being run by the Gas Council at Harrogate on October 6 and 7.

Mr. A. C. Bird has been appointed works manager of the roll foundry of Davy & United Roll Foundry, Limited, manufacturers of steel castings, etc., Empire Works, Billingham, Co. Durham, a subsidiary of the Davy & United Engineering Company, Limited, Darnall Works, Sheffield.

Mr. William W. Brooks, who has been appointed managing director of the Dorset Ironfoundry Company, Limited, and Difco, Limited, of West Quay Road, Poole, was formerly general manager and technical director of M. & W. Glazebrook, Limited, Dudley (general engineers and ironfounders).

Mr. D. C. M. Salt, director of sales, has been appointed alternate to Mr. J. W. Urban on the board of Monsanto Chemicals, Limited. Mr. Salt, who joined Monsanto in 1935, was appointed general manager of sales in 1956 and, prior to his recent appointment, was general manager of chemicals division.

Mr. Norman Readman, managing director of the Consolidated Pneumatic Tool Company, Limited, 232, Dawes Road, London, S.W.6, has been appointed chairman of Jacobs Manufacturing Company, Limited, and Frank Guylee & Son, Limited (both of Archer Tool Works, Sheffield), and also of the Reichdrill Manufacturing Company, Limited.

The inauguration of the new director of the Scientific Instrument Manufacturers Association of Great Britain, Captain Robert Alexander Villiers, C.B.E., A.M.I.E.E., R.N. (RETD.), took place last week. Until recently he was United Kingdom naval representative with the NATO military agency for standardization and chairman of the Naval Board, in London.

Mr. W. E. Jones, O.B.E., who is president of the National Union of Mineworkers and a member of the General Council of the T.U.C., has been appointed to the Monopolies Commission as a part-time member. The appointment will be for a term of three years dating from September 1. Mr. Jones is replacing Mr. A. J. Birch who has recently retired from the Commission.

Mr. R. F. A. Sampson, a director of Newton Chambers & Company, Limited, presented the Sir Samuel Roberts Cup, the premier award, at the Thorncliffe Horticultural Society's Show at Chapeltown on August 29, to 76-year-old Mr. Lionel Teasdale, who retired earlier this year after being a moulder at Newton Chambers for 63 years. He won six first prizes, eight seconds and 12 thirds.

Mr. Eric N. Simons, publicity manager of Edgar Allen & Company, Limited, Sheffield, is retiring from that post but is retained as publicity consultant to the firm. He also continues as Editor of the *Edgar Allen News* which he helped to found 40 years ago. Mr. Alan B. Jordan, of the National Gas & Oil Engine Company, Limited, has been appointed publicity manager in succession to Mr. Simons.

Mr. G. B. Perry has been appointed managing director of Axia Fans, Limited, a member of the Hall-Thermotank group of companies. He has also been appointed a director of Vent Axia, Limited, and will retain his seat on the board of Thermotank, Limited, with which company he formerly held the executive posts of director, engineering division, and general manager of its international products division.

Mr. D. E. Graham has been appointed managing director, and Mr. J. Riera, Mr. C. A. T. Brown and Mr. L. W. Bell, directors of James Archdale and Company, Limited, a subsidiary of the Staveley Coal & Iron Company, Limited, as from November 1. These appointments have been made in view of the advancing ages of Mr. Fred Archdale, Mr. James Archdale, Mr. Will Archdale—who will, however, continue as full-time directors, for the time being—and to secure continuity of management.

Mr. Harold Riggall is to relinquish the position of managing director of Ruston & Hornsby, Limited, engineers, steel and iron founders, etc., of Lincoln, at the end of the year. Announcing this at the company's annual meeting in London on September 2, the chairman, Mr. W. J. Ruston, said that Mr. Riggall would remain on the board in a non-executive capacity as deputy chairman and would also remain chairman of Ruston & Hornsby (Australia) Proprietary, Limited. Mr. Riggall has been with the company since 1923. Mr. V. R. Prehn and Mr. Geoffrey W. Bone have been appointed joint managing directors as from January 1, 1960. It was announced recently that Mr. Bone had assumed responsibility for the engineering policy of the company and its associate, Davey, Paxman & Company, Limited.

Obituary

Mr. A. Edgar Dickinson, managing director of Smith Bros. (Hyson Green), Limited, brassfounders, Bobbers Mill Road, Nottingham, has died at the age of 57. He was a member of the Nottingham Society of Engineers, and of numerous manufacturing organizations associated with engineering.

One of Australia's pioneers in the steel industry, Mr. Arthur Sidney Hoskins, has died in Sydney, aged 67. He was a co-founder of Australian Iron and Steel, Limited, the principal subsidiary of Australia's largest industrial organization, Broken Hill Pty. Limited, and he began Australia's first successful large-scale steel industry at Lithgow, New South Wales.

News in Brief

THE RECENTLY ESTABLISHED Belgian subsidiary of the Pressed Steel Company, Limited, Cowley, Oxford—Pressed Steel S.A., Cantersteen 7, Galerie Ravenstein 30, Brussels 1—is now in full operation.

THE address of the Bristol branch office of the English Electric Company, Limited, is now Equity and Law Building, 36/38, Baldwin Street, Bristol, 1. The telephone number remains the same (Bristol 27304).

AS PART OF THE SCHEME for the electrification and modernization of British Railways, an order for 91 three-car electric trains has been placed with the Pressed Steel Company, Limited, Linwood, Renfrewshire.

E. STEPHENS & SON, LIMITED, metal workers and merchants, 58-66, Bath Street, London, E.C.1, have taken over the old-established iron foundry of D. A. Aston & Company, Bastwick Street, London, E.C.1, and will continue to run it with its present management and staff.

MORE THAN 90 PER CENT. of the 15,000 workers employed by Colvilles, Limited, Glasgow steelmakers, and its subsidiaries, have intimated willingness to participate in the firm's non-contributory pension and life-assurance scheme which came into operation on September 1.

YET ANOTHER FILM featuring a branch of the United Steel Companies, Limited, is to be made next month. This time it is the turn of the Appleby-Frodingham Steel Company, Scunthorpe (Lincs), and later a film is to be made of the United Coke & Chemicals Company, Limited, Sheffield.

W. C. HOLMES & COMPANY, LIMITED, Turnbridge, Huddersfield, taking cognisance of the report of the Cohen Council on prices, productivity and incomes, and having introduced line production of blowers, announce their intention of reducing the sales prices of these items. In one case, the reduction in price amounts to 19 per cent.

THE SPANISH STEELWORKS, Ferrerias del Ebro S.A., are to erect a plant at Miranda de Ebro in which will be installed two electric furnaces capable of giving a yearly output of 65,000 tons. Another Spanish concern, Nueva Montana Quijano of Santander, may in the near future make castings for the local production of Renault cars.

MR. JOHN WIKELEY, engineer and surveyor to Chesterfield Rural Council, said at a meeting of the Council, that gas seeping through the soil in Pinfold Street, Eckington, was now known to be methane and experts were trying to discover the commercial possibilities. The sinking of a shallow bore hole to determine the extent of the gas was being considered.

GIDDINGS & LEWIS MACHINE TOOL COMPANY of Wisconsin, USA, which recently participated in the formation of Giddings & Lewis—Fraser, Limited, Arbroath, Scotland, have acquired an interest in Nassovia Maschinenfrabrik Hanns Fickert, near Frankfurt on Main, in Germany. It is in future to be known as Nassovia Werkzeugmaschinenfabrik G.m.b.H.

A FRENCH BRANCH OFFICE has been opened by Pollard Bearing Limited, Ferrybridge (Yorks). The address is:—Pollard-Roulements, 98, Rue Truffaut, Paris, 17e (telephone: MARcadet 09-10). A Montreal branch office is being opened by Canadian Pollard Bearings, Limited, Oakville (Ont), a Canadian associate company, at 623, Decarie Boulevard, Ville St. Laurent, PQ.

PLATT BROS. (SALES), LIMITED, Oldham, a subsidiary of Stone-Platt Industries, Limited, has secured a further order from the USSR. The contract is for woollen spinning machinery to the value of over £250,000. The whole of this equipment will be made at the Oldham factory of Platt Brothers & Company, Limited, and deliveries will commence at the end of this year.

COMPETITION of the Eastern block is making itself increasingly felt in many developing countries where the gap between expectations of capital assistance from Germany or Europe and funds actually available widened during the year, states the annual report of Ferrostaal, AG, the German iron and steel company. Invoiced deliveries in 1958 totalled about £63 million.

BETWEEN 70 AND 80 MEN will become redundant at the Pallion, Sunderland, factories of Bristol-Siddeley Engines, Limited, due to programme changes and the completion of certain contracts. The works employs 1,000 men, producing components for the Proteus, Orpheus, and Olympus gas-turbine engines. Further redundancy, on a smaller scale, may arise later in the year.

UNITED STEEL COMPANIES, LIMITED, Sheffield, have purchased a third aeroplane for the use of their executives at a cost of £30,000. It is a six-seater Italian Piaggio which is being added to their existing fleet of two aeroplanes to take executives from the firm's different centres on business trips. The group has operated its own aeroplanes for some years because of the great saving in time.

FOLLOWING THE MERGER between J. & E. Hall, Limited, the Dartford (Kent) ironfounders and engineers, and Thermotank, Limited, air-conditioning, heating and ventilating engineers, of Glasgow, a trading agreement which the latter company had with Woods of Colchester, Limited, has been discontinued. The agreement provided for the sale of Thermotank/Woods fans to the marine industry.

CHANGES IN THE wholesale inland selling prices of certain of the products of Shell-Mex & B.P., Limited, are announced. Gas-oil and marine-diesel fuel have been reduced in price by ½d. a gallon, while the price of light fuel-oil has been increased by ¼d. a gallon and that of heavy fuel-oil by ½d. a gallon. A reduction of ½d. a gallon in the price of gas-oil is announced by the National Benzole Company, Limited.

FORD MOTOR COMPANY, LIMITED, has placed with Birlec, Limited, orders totalling some £75,000 for three gas-carburizing furnaces. The largest is a continuous furnace, to be heated by gas-fired radiant tubes, for carburizing transmission gears, and it is the third such furnace commissioned from Birlec by Fords. With a carburizing cycle of about 9½ hr., the furnace is designed to give an output of some 800 lb. per hour.

A ONE-DAY CONFERENCE for business executives, to be held on November 20, in the Royal Festival Hall, London, is to be addressed by nine eminent doctors who will speak on illnesses to which executives are susceptible. Tickets cost four guineas each and include morning coffee, luncheon (with wines), and tea. These are available from the Chest and Heart Association, Tavistock House North, Tavistock Square, London, W.C.1.

THE WEST RIDING OF YORKSHIRE BRANCH of the Institute of British Foundrymen is to hold a meeting on September 12, at 5.30 p.m., when Mr. H. W. Griffiths (president) has invited members to tea at 1, Mannville Terrace, Bradford, before proceeding to the Bradford Institute of Technology at 6.15 p.m. The evening's programme includes his Address and showing of the Samuel Osborn film "Socast Steel Castings."

News in Brief

A MEETING OF MEMBERS, in the Lancashire and Cheshire area, of the Association of Bronze & Brass Founders is to be held on September 22 at the Engineer's Club, Albert Square, Manchester, commencing (with tea) at 5.30 p.m. Following the members' meeting, there will be an "open" meeting at 6.30 p.m., when Mr. W. H. Davies will elaborate on the system advocated in the Association's publication "Costing a Casting."

A £100,900 AMERICAN CONTRACT for the manufacture of 200 tons of non-ferrous tubing has been secured by Serck Tubes, Limited of Greet, Birmingham. The contract is for brass and nickel tubing to be installed in a new power-station owned by the Tennessee Valley Authority. An official spokesman for the company said the closest competition came from other British firms and that American estimates were appreciably higher. Delivery is to be completed by the end of the year.

SIR JOHN CASS COLLEGE, Jewry Street, Aldgate, London, E.C.3, announce a number of evening classes on specialized subjects, which include spectrochemical analysis; radio-active isotopes in metallurgy and ceramics; radio chemistry and radio activity; electronic computing systems; absorption spectroscopy; and statistical methods in scientific and industrial research. Full details of these courses can be obtained on application to the secretary of the College at the above address.

THE INDUSTRIAL SECTION of the Central Film Library, Government Buildings, Bromyard Avenue, Acton, London, W.3, in its "New Releases," Autumn 1959, lists 22 films. Some of these are eminently suitable for showing at foundry technical meetings as, for instance, "Vanishing Dust," which is issued free of charge. It is from F. H. Lloyd & Company, Limited, and is of 11 min. duration. Programme secretaries of technical institutes and especially branch secretaries are advised to write for this list.

THE BOARD of the Imperial Aluminium Company has been constituted as follows:—From Imperial Chemical Industries: Dr. JAMES TAYLOR (chairman), Mr. BERKELEY VILLIERS (managing director) and Mr. MICHAEL CLAPHAM. From the Aluminium Company of America: Mr. DuBOSE AVERY and Mr. F. J. RESCH. The Imperial Aluminium Company was formed recently to link Imperial Chemical Industries with the Aluminum Company of America in the manufacture of wrought-aluminium products.

THE MINISTER OF EDUCATION has awarded technical State Scholarships to three apprentices at Leyland Motors, Limited, and has placed five more of the company's employees on the reserve list for this type of scholarship. The boys are part-time students at Leyland Motors day continuation school. Mr. H. Bayley, principal of the school, said that since the school's syllabus had been altered two years ago to take boys up to National Certificate level, five State Scholarships had been awarded to employees.

THE PLACING OF MUNICIPAL CONTRACTS in order to provide employment for Scottish workers was urged at a meeting of Glasgow Corporation on September 4, and it was ultimately agreed to give a Falkirk firm part of an order for electric cookers. A minute of the Housing Committee recommended acceptance of an offer by the GEC, Limited, Glasgow, to supply 1,500 three-plate cookers at a total cost of £33,900. An amendment that 750 of the cookers be purchased from GEC for £16,950 and the other 750 from Falkirk Iron Company, Limited, at a cost of £17,062 10s., was carried.

DAVY AND UNITED ENGINEERING, LIMITED, Sheffield, have received a contract for building a 68-in. semi-continuous hot strip mill for the Ravenscraig works of Colvilles, Limited, Glasgow. The contract is worth more than £4,000,000, and 9,000 tons of machinery will be made, much of it at the Glasgow works of the Sheffield firm. The new mill will produce strip and light plate from 24-in. to 60-in. wide in coils weighing up to 40,000 lb. and will be driven by over 47,000 h.p. It will be designed for an eventual output of more than 1,500,000 tons a year but will start with an output of 500,000 tons a year.

DOUGLAS FRASER & SONS, LIMITED, engineers, Arbroath, have announced the following changes in their directorate:—Mr. HUGH FRASER has been appointed chairman in place of Mr. JOHN G. FRASER, who has resigned from the chairmanship on his appointment as managing director of Giddings & Lewis-Fraser, Limited (the merger of the American firm of Giddings & Lewis with Fraser & Sons was announced in the JOURNAL, August 20 issue). In addition to being chairman of Douglas Fraser & Sons, Mr. Hugh Fraser is the textile-machinery manager of Giddings & Lewis-Fraser, Limited. Mr. KEITH H. FRASER has been appointed managing director of the spinning, [illegible] and candlewick activities of Fraser & Sons. Mr. ALEXANDER PETRIE, secretary of the company, continues to act in that capacity and is also secretary of Giddings & Lewis-Fraser.

Recent Wills

BAXTER, W. B., former director of the United Steel Companies, Limited, Sheffield, vice-president of the Iron and Steel Institute, and chairman of the Lincolnshire Ironmasters' Association ...	[illegible]
BOYD, SIR ARCHIBALD JOHN, chairman of Metropolitan-Cammell Carriage & Wagon Company, Limited, a director of Cammell Laird, Limited, Associated Electrical Industries, and other companies ...	£46,547
ROWSE, A. A., chairman of Venner, Limited, electro-mechanical engineers, of New Malden (Surrey), formerly for many years a director and production manager of Morris Motors, Limited ...	£242,180
BURTON, MARK, former managing director of Marshall, Sons & Company, Limited, manufacturers of tractors, steam-raising equipment, etc., of Gainsborough (Lincs)	£32,335

Changes of Name

Among companies which have recently changed their names are those listed below. The new titles are given in parentheses.

B.S.A. CARS, LIMITED, Armoury Road, Birmingham (Jessop-Saville (Small Tools), Limited).

SKELTON, SLEAT & COMPANY, LIMITED, Castle Gate, Reigate, Surrey (Redland Engineering, Limited).

CAMDEN PLATING COMPANY LIMITED, 77, Parkway, London, N.W.1 (Camden Plating Company (Holdings), Limited).

B.S.K. INDUSTRIES (ENGINEERING), LIMITED, St. Cuthberts Road, Gateshead 8 (Bede Engineering Company, Limited).

MAPLE ENGINEERING COMPANY, LIMITED, 14, Maple Road, Redhill, Surrey (Deerbarn Engineering Company, Limited).

WILLIAM JESSOP & SONS, LIMITED, ironmasters, steelmakers, etc., of Brightside Works, Sheffield (Jessop-Saville, Limited).

STRAIGHT TORQUE, LIMITED, ironfounders, engineers, etc., of Berkeley House, Hay Hill, London, W.1 (Ambuco, Limited).

LITTLEWOOD & HARLING, LIMITED, millwrights, ironfounders, etc., of Waverley Works, St. Thomas Road, Huddersfield (Littlewood Engineers (1959), Limited).

SIMWAT, LIMITED, manufacturers of stoves and ovens, etc., of 52, London Road, London, S.E.1 (Aquafont Equipment, Limited).

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(Patent applied for)

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Raw Material Markets

Iron and Steel

The steady improvement in trading among the ironfoundries is maintained. Nevertheless, the volume of work on hand is still well below capacity. High-duty castings are being called for at a good rate from the engineering and speciality foundries, the motor vehicle trade continuing to be well to the fore in this respect. Other consumers are also taking up larger quantities of these castings. There is a better demand from the machine-tool trade, while the steelworks are using a larger tonnage of ingot moulds and castings.

Pig-iron is plentiful, despite the fact that production is not at capacity. Both producers and consumers are carrying sizable stocks. Chief demand is for low-phosphorus iron, but there is no difficulty in meeting all needs. Hematite and refined irons are easy, and the quantities of high-phosphorus iron available far exceed requirements. The steelworks are taking up moderate tonnages of basic iron, and there is plenty to spare.

Scrap for the foundries is forthcoming satisfactorily, except, perhaps, for the higher grades of cast-iron scrap such as cylinder blocks. Good deliveries of foundry coke are to hand, and ganister, limestone, and firebricks are easily obtainable.

The re-rollers maintain their improved rate of production and continue to receive increased business for small bars and light sections. Reinforcing rods are also in heavy demand. There is an increasing call for steel semis from home steelworks, most of which have orders on hand to cover outputs for several weeks ahead. Stocks of billets, blooms, etc., at most of the re-rollers are insufficient to cope with current consumption, and difficulty is being experienced in placing orders with the steelworks for prompt delivery.

Non-ferrous Metals

Copper is an interesting market and pressures now being exerted may soon determine a new trend in prices on both sides of the Atlantic. The present position is that at least 75 per cent. of the US domestic production of copper is tied up by the strike of the Mine, Mill, and Smelter Workers' Union. In fact, of the major producers, only American Smelting & Refining is still in production. On a global basis, this means that approximately 40 per cent. of the world's copper production is strikebound and, therefore, a continuation of this strike for any length of time must whittle down stocks and push up prices. The reason this has happened in only a small way so far is because until now hopes were that the strike would not be a long drawn out affair and, secondly, there is a great deal of uncertainty as to whether the longshoremen will go on strike at the end of this month.

However, the current belief is that the Mine, Mill, and Smelter Workers' Union will not easily be brought to terms and that there may well be something like near panic buying of copper before the end of the month as a hedge against the longshoremen's strike. As an added incentive for consumers to watch closely the market, there is the report available that labour difficulties exist at the El Teniente Mine in Chile. In these circumstances the US custom smelters refused to quote a price for a couple of days last week, the price of 30 cents a pound being a purely nominal listing. By the end of the week, however, the custom smelters had come back into action, having raised their price to 33 cents a pound, a rise of 3 cents a pound. This is *equivalent to £264* a ton and compares with the unchanged producers' price of 30 cents a pound, or £240 a ton.

The London market has benefited from this situation and the price has been rising gradually, with demand from domestic and continental sources improving. The immediate outlook, given a continuation of the present situation, is for the price to increase gradually until stocks show visible signs of decreasing and the [illegible] for the quotation to go ahead more sharply.

Tin was quiet in front of the official communiqué issued by the International Tin Council towards the end of last week. Prices trended easier in London and in the East, although the undertone in both centres was firm. In the event, the ITC raised the permissible level of exports for the fourth quarter of this year by 5,000 tons to 30,000 tons. This compares with a quota increase of 2,000 tons for the third quarter and is indicative of the confidence in the outlook for the metal. For Malaya, it will mean that the mines are producing at nearly 80 per cent. of capacity. The council also agreed to continue the buffer stock manager's operations between £780 and £830 a ton until the end of this year. The council gave no clue as to the present size of the buffer stock beyond saying that it contained 21,020 tons at the end of March last. The next meeting of the International Tin Council is fixed for December 1.

Marketwise, tin remains steady and the belief is that the extra quotas will be easily absorbed. The market is still held down by the US steel strike, but when that industry is again in full production the price is expected to go ahead slowly until stocks in the buffer stock are brought down to a more manageable tonnage.

The feature in lead has been the rise in the US price by 1 cent to 13 cents a pound. The strike in the US copper industry is hampering the production of lead and zinc, which has helped to put some strength into this market. At present, work is still going on at the Bunker Hill Company, the second largest lead producer in the US, but labour is working on a day-to-day b[illegible] with the deadline for a strike at Tuesday next. Ori[illegible]ally, the Mine Mill, and Smelter Workers' Union threatened to strike against the company on August 31. The London market is quietly steady with sentiment good about the future outlook for the metal. Nevertheless, there has not been any real favourable reaction to the rise in the US price, with the result that the LME quotation is slipping slowly back to around £[illegible] a ton.

Zinc is irregular. This is partly due to the absence of any real market activity in "Prime Western" in the US because of the steel strike and partly because prompt metal is somewhat scarce at times in London. Overall demand is, however, satisfactory and the price in the UK, at around £86 a ton, compares with the US price of 11 cents a pound, or £88 a ton.

National Society of Master Patternmakers

The National Society of Master Patternmakers opens its 1950/60 programme with a lecture to be given by Mr. H. G. C. King (of the Locomotive Works of British Railways, Crewe) on September 22 at the Charing Cross Hotel, London, W.C.2, commencing 7 p.m. In his paper, "Introduction to Patternmaking in Plastics," Mr. King will deal with materials and equipment required, production of master patterns and moulds, and various methods of pattern manufacture from the solid casting of small patterns to the building of large patterns by a system of lamination. The paper will be illustrated by slides and there will also be practical examples available for inspection. Tea and light refreshments will be provided immediately prior to the meeting by the courtesy of Mr. B. Levy of B. Levy & Company (Patterns), Limited. (Non-members will also be welcomed.)

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HISTORICAL NOTE

R. & A. Main Ltd. were established in Glasgow in the 1870's. Following the amalgamation with Thomas Glover & Co. Ltd. in 1897, extensive sites were acquired at Edmonton and Falkirk. They produce a wide range of domestic appliances including the 'Century' gas cooker, the 'Century' gas heater and the Main No. 36.c. Refrigerator — the first to carry a ten year guarantee.

Imports and Exports of Iron and Steel in July

The following tables, based on Board of Trade returns, give figures of imports and exports or iron and steel in July. Totals for the first seven months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended July 31.	Seven months ended July 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Cyprus	137	3,880	911
Sierra Leone	2,363	8,279	6,055
Ghana	2,506	8,153	17,965
Nigeria	6,159	38,962	44,271
Union of South Africa	2,969	63,264	26,079
Rhodesia and Nyasaland	2,823	23,020	13,012
Tanganyika	1,793	7,370	10,300
Kenya	1,178	26,957	11,998
Uganda	111	1,810	2,924
Mauritius	186	2,288	824
Aden	441	2,030	1,748
Bahrein, Qatar, and Trucial States	830	5,436	4,905
Kuwait	675	25,960	7,432
India	14,591	79,892	103,373
Pakistan	3,388	40,418	19,680
Singapore	1,599	21,730	12,971
Malaya	962	9,426	6,529
Ceylon	1,762	17,477	27,182
British North Borneo	241	1,404	1,743
Hongkong	6,887	33,367	40,763
Australia	6,833	56,558	49,655
New Zealand	10,315	109,199	55,199
Canada	23,103	118,634	99,940
Jamaica	3,118	11,497	13,252
Trinidad	5,340	31,750	26,052
British Guiana	1,174	4,728	4,192
Other Commonwealth countries	2,281	20,524	21,572
Eire	3,939	30,386	27,445
Soviet Union	3,563	12,105	7,501
Finland	3,468	28,498	20,078
Sweden	9,134	77,674	67,714
Norway	6,427	54,020	52,430
Denmark	8,812	54,974	56,101
Western Germany	10,699	19,108	63,320
Netherlands	13,684	49,658	55,870
Belgium	2,758	13,997	17,262
France	433	1,733	1,627
Switzerland	678	6,640	4,810
Portugal	1,289	8,750	9,737
Spain	3,511	32,343	19,115
Italy	5,983	24,494	31,669
Austria	477	6,928	2,108
Yugoslavia	59	2,521	1,776
Greece	1,007	8,697	6,972
Turkey	787	3,280	4,059
Netherlands Antilles	165	1,247	1,694
Portuguese East Africa	92	1,530	810
Egypt	49	10,478	1,272
Sudan	609	24,180	4,910
Lebanon	36	8,350	1,739
Israel	1,838	4,774	7,745
Saudi Arabia	335	3,279	2,824
Iraq	3,359	21,411	50,810
Iran	3,463	21,765	16,854
Burma	1,189	5,859	5,655
Thailand	962	3,913	5,677
Indonesia	762	1,265	3,310
Philippine Republic	770	2,134	3,098
USA	23,160	46,272	90,486
Cuba	358	3,447	4,480
Columbia	337	4,580	1,536
Venezuela	6,940	49,954	46,575
Ecuador	13	1,914	546
Peru	72	7,098	1,460
Chile	94	3,658	915
Uruguay	5	700	705
Agrentina	17,124	85,047	122,321
Other foreign countries	50,443	61,558	169,645
TOTAL	292,648	1,584,232	1,625,188

Laporte Industries, Limited—Mr. B. E. A. Vigers has relinquished the position of assistant managing director and has been appointed a deputy chairman of the company and technical director of the Laporte group of companies.

Total Imports of Iron and Steel

From	Month ended July 31.	Seven months ended July 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	455	4,262	2,981
Canada	1,579	11,978	9,744
Other Commonwealth countries and Eire	3,381	14,848	19,366
Soviet Union	8,520	107,521	25,353
Sweden	1,585	20,357	15,234
Norway	7,079	44,722	47,056
Poland	426	83	3,222
Western Germany	7,439	48,439	34,864
Netherlands	13,707	88,708	103,507
Belgium	816	58,432	14,526
Luxembourg	581	4,788	4,495
France	2,574	13,509	13,410
Italy	3,582	3,828	8,054
Austria	705	3,022	2,537
Japan	—	2,232	—
USA	1,709	113,777	17,973
Other foreign countries	3,331	2,989	10,053
TOTAL	57,469	543,495	332,375
Iron and steel scrap and waste, fit only for the recovery of metal	486	54,837	2,511

Exports of Iron and Steel by Products

Product.	Month ended July 31.	Seven months ended July 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Pig-iron	10,755	68,734	72,239
Ferro-columbium (niobium)	1	19	26
Ferro-tungsten	102	394	739
Other ferro-alloys	511	2,014	2,987
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	6,648	7,154	42,530
Pieces roughly shaped by forging*	79	4,870	1,018
Iron bars, rods, angles, shapes, and sections	155	994	764
Steel bars, rods, angles, sections, and shapes	48,638	204,882	215,118
Iron plates and sheets	19	1,795	238
Universal plates	806	3,114	4,614
Steel plates, 3mm. and under 4.5mm. thickness	4,476	4,562	26,603
Ditto, 4.5mm. or more in thickness	26,559	111,958	109,766
Blacksheets and blackplate	24,336	174,478	153,673
Hoop and strip	9,328	35,168	49,379
Tinplate	49,201	213,699	275,842
Decorated tinplate	922	1,662	5,529
Galvanized sheets	8,527	42,771	53,223
Other (incl. tinned sheets, terneplate, and ternesheets)	2,829	7,852	12,569
Railway and tramway construction material	16,624	152,612	97,808
Wire rods of steel (incl. alloy steel)	6,603	21,924	30,598
Wire	9,161	61,394	61,918
Tubes, pipes, and fittings	66,368	462,182	408,007
TOTAL	292,648	1,584,232	1,625,188

* The figures for 1959 are not completely comparable with those for previous years.

Mr. E. N. Evans has been elected a director of Blackstone & Company, Limited, diesel-engine manufacturers, Stamford, Lincolnshire, a member of the R. A. Lister group.

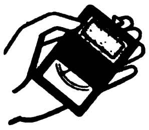
Electrical Aids in Industry *Data Sheet* **No. 6**

Lighting-1

Good lighting affects productivity in three ways, (1) by directly increasing the speed of working and reducing errors and wastage, (2) by improving overall factory efficiency through better supervision and housekeeping, (3) by providing better working conditions, thus improving labour relations and avoiding frequent changes of workpeople.

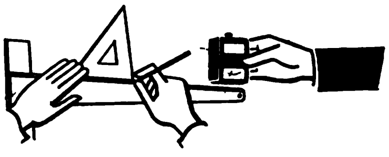
It is not possible to judge by the eye alone whether the lighting in any factory is good enough to serve these purposes because the eye has a tremendous range of adaptation (vision of some kind is possible within an illumination range of 1,000,000 to 1) and is hence an unreliable measuring instrument. Severe mental and eye strain or unconscious slackening of working speed may occur under lighting which *appears* to be adequate.

The only reliable way to appraise factory lighting is to conduct a lighting survey using a lightmeter an inexpensive instrument which measures the actual illumination available. These figures can then be compared with official recommended values for the various tasks.



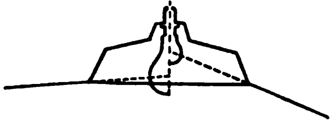
NATURE OF WORK, PROCESS OR MATERIAL	ILLUMINATION LUMENS/SQ.FT.
Rough or routine work. Large detail. Medium to light material of good contrast.	7
Ordinary work usually involving workers' inspection. Medium detail and contrast.	15
Skilled work, small detail or dark material.	30
Fine or critical work, very small detail, very poor contrast or very dark material.	50
Very fine exacting work.	100

In addition, readings should be taken at selected working points with the lightmeter so placed that it measures the light on the work while the operative is working. This will indicate whether full use is being made of the light or whether shadow is obscuring part of it.



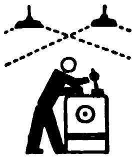
Glare

Any direct light on the eye tends to reduce its sensitivity—thus reducing the power to see. Increasing the intensity of the light source may therefore not improve matters unless care is taken to avoid glare either by correct positioning or by the use of correctly matched reflectors and lamps.



Shadows

Unnecessary shadows may seriously slow down work and also cause accidents. Lightmeter readings should always be taken under conditions exactly similar to those obtaining while work is going on. The operative himself may mask his work, an overhead crane or a heavily loaded conveyor belt may periodically obscure a light fitting, or a dust-laden atmosphere may reduce the designed lighting values.



For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434

Excellent reference books are available on electricity and productivity (8/6 each or 9/- post free)—"Lighting in Industry" is an example.

E.D.A. also have available on free loan a series of films on the industrial uses of electricity. Ask for a catalogue.

7659-4

CUT HERE

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

September 9, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 6-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 6-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 11s. 6d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 6-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 10d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 10d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £236 0s. 0d. to £236 5s. 0d.; three months, £235 5s. 0d. to £235 10s. 0d.; settlement, £236 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3¼d. per lb.; rods, 254s. 0d. per cwt. basis; 20 s.w.g., 289s. 0d. per cwt.

Tin.—Cash, £793 0s. 0d. to £793 10s. 0d.; three months, £792 0s. 0d. to £792 10s. 0d.; settlement, £793 10s. 0d.

Lead (Refined Pig).—First halt September, £71 15s. 0d. to £72 0s. 0d.; first half December, £73 2s. 6d. to £73 5s. 0d.

Zinc.—First half September, £86 17s. 6d. to £87 0s. 0d.; first half December, £85 5s. 0d. to £85 7s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £121 15s. 0d.; rolled zinc (boiler plates), all English destinations, £119 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £99 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10¾d. per lb.; sheets to 10 w.g., 202s. 6d. per cwt.; wire, 2s. 8¼d.; rolled metal, 202s. 6d. per cwt.

Brass (Brazing).—BS1400, B3, £156; B6, £200.

Brass (High Tensile).—BS1400, HTB1, £186; HTB2, £202; HTB3, £213.

Gunmetal.—BS1400, LG2, £192; LG3, £202; G1, [illegible] £252; G1, 1%, £240.

Phosphor Bronze.—BS1400, PB1 (AID released), £289; BS1400, 90/10/1, £271.

Leaded Phosphor Bronze.—BS1400, LPB1, £213.

Phosphor Bronze Strip, etc.—Strip, 290s. 9d. per cwt.; wire, 4s. 1½d. per lb.; rods, 3s. 4½d.; tubes, 3s. 4½d.; chill cast bars: solids 3s. 4¼d.; cored 3s. 5¼d. (Charles Clifford, Limited.)

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F. H. HAPPOLD *For most of his working life F. H. Happold has been a journalist writing mainly on economic, industrial and financial subjects.*

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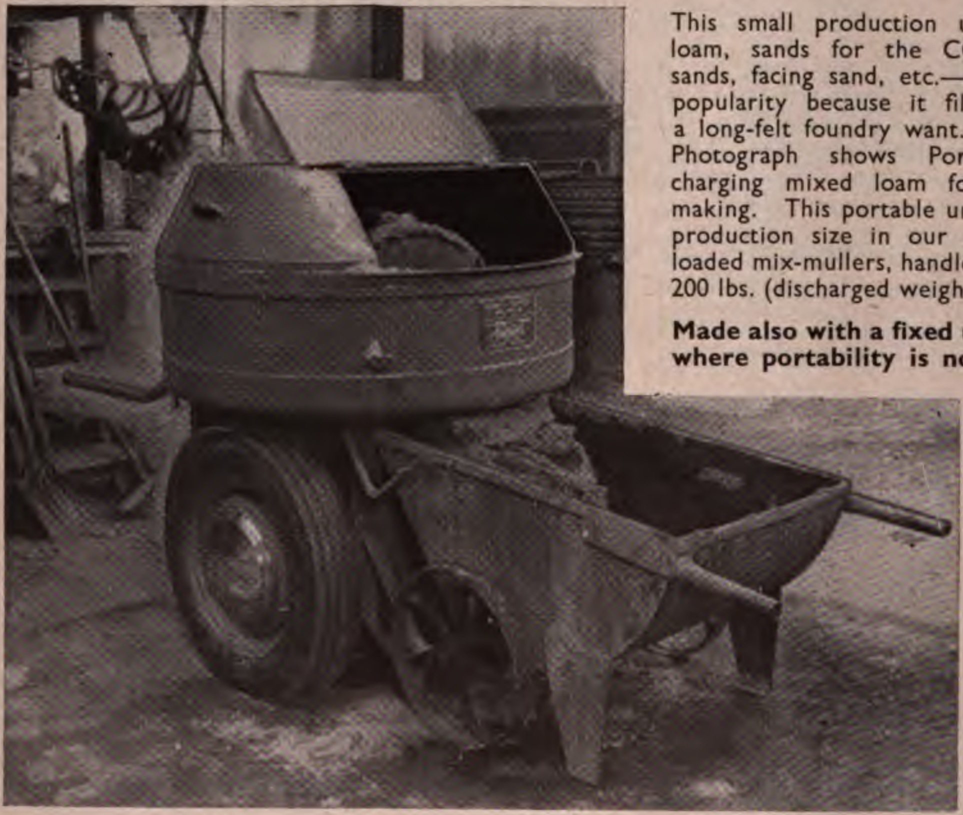

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J.J.M.

FOUNDRY
TRADE JOURNAL
Vol. 107 SEPTEMBER 17, 1959 No. 2232

Importance of Clean Metal

A very great number of factors can result in dirty or unsound castings, and some of these often escape the attention of the managers of both large and small foundries. Primarily, much can be done in the control of raw materials entering a furnace, such as for instance, elimination of broken-up castings from chemical works contaminated with really excessive quantities of sulphur, or, in the non-ferrous foundry, a bar on the use of " gypsied "-up scrap. Any effort towards cleanliness pays dividends, and here again we fail to see why over-metal should be poured into sand, instead of being cast into properly prepared chill moulds. Some foundries even shotblast all runners and heads before recharging into furnaces.

Many good systems are available for separating slag from metal at furnace spouts. When molten metal is taken from a furnace, it is worthy of being received in a clean ladle or shank, as neglect in this matter has been known to cause dirty and defective castings. Much thought, too, has been devoted to ensuring that only clean metal leaves the ladle, the two outstanding cases being the adoption of bottom-pouring techniques and tea-pot ladle types. Sometimes however these methods—when temperature drop is associated with the pouring of thin-section castings—are not always thought to be practical.

Next comes the pouring of metal into moulds. Here, with some of the light alloys, great care has to be taken not to agitate the metal, as any turbulence induces the formation of alumina dross, and the Durville method of pouring comes into prominence to ensure a minimum of movement of the metal. For casting manganese-bronze, a gadget resembling the bottom-pouring ladle has been used with success. In the running and feeding of moulds, ingenious combinations of systems take care both of directional solidification and cleanliness of metal. The filtering of metal has also received much consideration over the years. The use of oil-sand cores for this purpose was only a partial solution as only too often they were insufficiently refractory to withstand the heat of the metal and later, at least some of the sand became incorporated. Ceramic filters should supersede these as they are still intact though, of course, not re-usable after breaking up the mould. Moreover, on a meticulous costing basis, they are probably no dearer than the oil-sand type and infinitely more effective. Filters of this type are extensively used in some parts of the world, and are finding an increasing popularity in this country.

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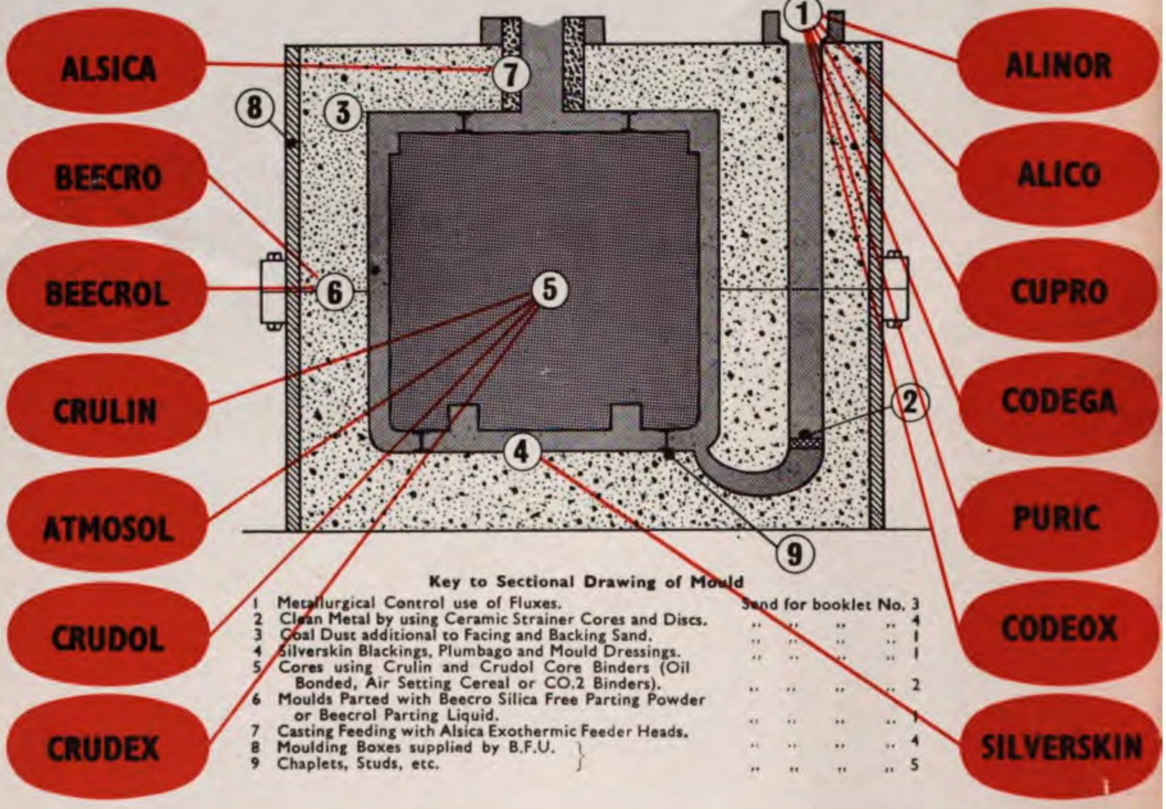

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fractory Concrete in Foundries

By E. Hammond, B.Sc., Ph.D., A.R.I.C., M.Inst.F.*

Perhaps the most striking change in the use of refractories in the post-war years has been the increased applications of refractory and insulating concretes, which have given to the furnace and maintenance engineer the same facilities and advantages of monolithic concrete construction enjoyed up to comparatively recent times only by the civil engineer and the building industry. Recent developments have now made it possible to employ refractory concretes in furnace construction and the like to operate at temperatures up to 1,800 deg. C. The monolithic method of construction eliminates the innumerable joints of furnace brick-work which, of course, are often the "weak link" in a refractory structure since, apart from the unavoidable leaks, failures of units such as doors or arches may be due initially to displacement of one or two bricks.

casting of refractories for use in foundries particular value when there is a shortage of bricklayers, since there is no expensive and fitting of the brickwork, and special such as burner blocks, etc. can be easily cast uitable moulds.

PROPERTIES

ractory concretes consist essentially of a suit- efractory aggregate bonded by a hydraulic tory cement. Until quite recently the only f cement employed was high-alumina cement iment Fondu), a grey cement made by fusing ure of bauxite and limestone in a reverbera- rnace. The unqualified term "refractory con- ' normally refers to a mixture of high-alumina t and crushed good-quality alumino-silica ck. A mix of this type has a maximum temperature limit of 1,300 to 1,350 deg. C. lemand for refractory concretes in many ations at higher operating temperatures re- in the development of a pure white calcium iate cement (*e.g.* Secar 250) which, being made exceptionally pure materials, contains negli- quantities of silica and iron oxides and is, uently, much more refractory than the well- high-alumina cement. Typical compositions two types of cement are given in Table 1. rey high-alumina cement is also called, in ountry, aluminous cement and, sometimes

ABLE 1.—*Typical Percentage Compositions of Cements.*

ntage of	High-alumina cement (Ciment Fondu).	Pure tri-calcium penta-aluminate cement (Secar 250)
$_2O_3$	40.0	71.5
O	37.5	27.5
$_2O_3$	9.0	< 1.0
O	7.0	
O_2	4.5	
O_2	2.0	

l, calcium aluminate cement, whilst the pure calcium aluminate cement is often referred to as tricalcium penta-aluminate cement because its composition corresponds approximately to a compound $3CaO.5Al_2O_3$. This compound does not exist and the cement is, in fact, a mixture of calcium monoaluminate ($CaO.Al_2O_3$) and calcium dialuminate ($CaO.2Al_2O_3$). However, for the purpose of brevity and clarity the two cements will be referred to henceforwards as h.a. cement (high-alumina) and t.c.p.a. cement (tricalcium penta-aluminate) respectively.

Although some of the properties of refractory concrete are naturally governed by the type of refractory aggregate employed, the main properties depend, of course, on the essential constituent—h.a. cement or t.c.p.a. cement. Refractory concretes made with either of these cements have the following properties:—

Chemical Stability at High Temperature

Both these cements are stable up to their melting-points and it is, of course, for this reason mainly that they have been used in refractory applications. Portland cements cannot be used at temperatures above about 250 deg. C., since, on heating, they chemically decompose with the liberation of free lime which augments the amounts already present at normal ambient temperatures. It is also interesting to note that the absence of free lime in h.a. and t.c.p.a. cements, coupled with the alumina gel structure of the cement bond, confers on the cements chemical resistance properties to dilute acids, etc., which may be found in flue gases, and this resistance increases at higher temperatures.

Strength Characteristics

Both cements are extremely rapid hardening and refractory concretes attain full cold strength at 24 hours, being then ready for most applications. The effect of temperature on the strength[1] of perhaps the most commonly used mix (h.a. cement/crushed firebrick) is illustrated in Fig. 1. The cold strength is partially lost as the temperature increases due to the dehydration of the hydraulic bond. At temperatures of approximately 1,100 deg. C. and over a ceramic bond is formed which increases both with

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Hammond is on the staff of Lafarge Aluminous Cement , Limited.

Refractory Concrete in Foundries

time and temperature, and a fired strength is obtained which may be even greater than the original high cold strength. This type of curve is applicable to all types of refractory concrete although variations do occur according to the type of cement employed and the refractoriness and type of aggregate. For instance, if a fused alumina aggregate is used instead of crushed firebrick a higher strength may be obtained in the cold and at temperatures up to 1,100 deg. C. due to the greater inherent strength of the fused alumina. On the other hand, the increased refractoriness of the fused alumina would delay the onset of ceramic bond until a temperature much higher than 1,100 deg. C. was reached. Similarly, if a t.c.p.a. cement/crushed firebrick mix were used, similar strengths could be expected up to 1,100 deg. C. to those obtained with the h.a. cement corresponding mix, but the greater refractoriness of t.c.p.a. cement would delay the formation of ceramic bond until a temperature of approximately 1,300 to 1,400 deg. C. was reached.

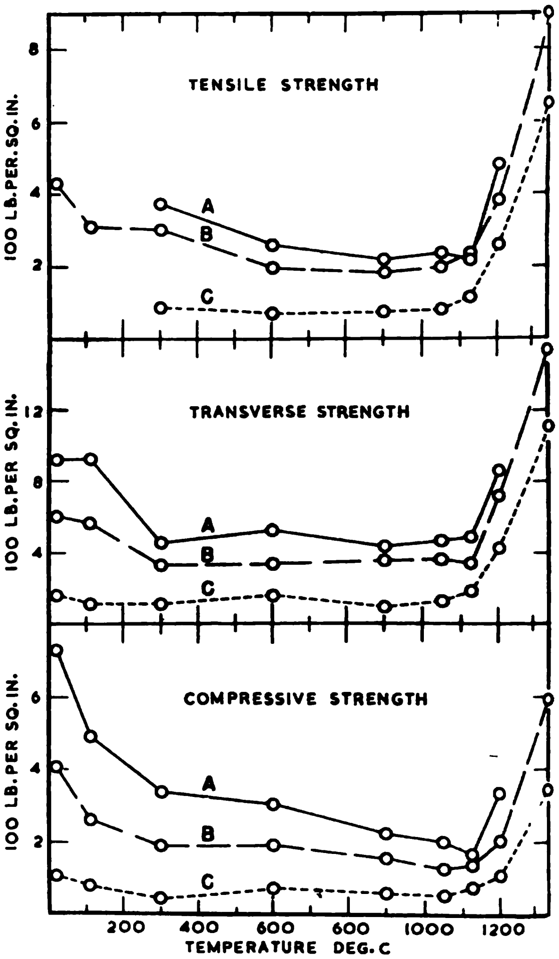
It is apparent from these curves that, for installations operating at temperatures well below the service temperature limit of the mix employed and where strength and abrasion resistance are prime considerations, it is advantageous to use a concrete with a relatively high cement content. It should be remembered, however, that in mixes containing an aggregate which is more refractory than the cement (*e.g.* h.a. cement/crushed firebrick), the service temperature limit of the refractory concrete tends to decrease with greater cement content—but this, of course, does not always apply to the t.c.p.a. cement mixes since this material may be more refractory than the aggregate employed.

Thermal Shock Resistance

The extremely low spalling tendency of refractory concretes made with either cement when they are subjected to rapid temperature fluctuations is well known, and it seems probable that this is due to the "elastic" nature of the alumina gel cement bond, owing to its micro-porous structure. Consequently, it is possible to employ a refractory aggregate of high spalling tendency and yet obtain a refractory concrete with good thermal shock resistance although, of course, the use of an aggregate of low spalling tendency is naturally advisable for extremely rapid temperature fluctuations.

Thermal Expansion Characteristics

In the manufacture of what may be termed "traditional" refractory bricks and units the general aim is the production, during the firing operation, of units which are fully shrunk, so that when put into service they exhibit reversible expansion and contraction on heating and cooling. Consequently, in the design of furnaces, etc., liberal provisison has to be made for expansion joints. One of the advantages of refractory concretes is that they do not normally require pre-*firing before being put into* service, and this results in their expansion characteristics under service conditions being different from, say, a normal firebrick. This is particularly evident when the refractory concrete is first put into service and taken up to operating temperature since, during this first firing, moisture is driven off and the resultant shrinkage is superimposed on the inherent expansion of the aggregate employed. This operation is illustrated by the curve A-B in Fig. 2, and it will be noted that the dimensions at the operating temperature are, for all practical purposes, similar to the cast dimensions of the cold unfired unit, *i.e.* there is practically no expansion. On cooling, thermal contraction occurs and the



(*Courtesy:* Journal *American Ceramic Society.*)

FIG. 1.—*Comparison of the various strengths of refractory concrete (h.a. cement/crushed firebrick) containing differing percentages of h.a. cement, after the following treatments:* 24 *hr. at* 20 *deg. C.,* 24 *hr. at* 110 *deg. C.,* 4 *months at* 300 *deg. C.,* 4 *months at* 600 *deg. C.,* 5 *hr. at all higher temperatures indicated—(A)* 30 *per cent. cement, (B)* 20 *per cent., (C)* 10 *per cent.*

FOUNDRY
TRADE JOURNAL

Vol. 107 SEPTEMBER 24, 1959 No. 2233

Foundry Coke

This commodity is of basic importance to the ironfoundry industry, but compared with pig-iron, its technical sales conditions lag woefully behind. The last three decades have seen many changes in the conditions of sale of pig-iron, involving the replacement of just numbers by chemical composition and, in most cases, machine-cast pig has replaced the sand-cast variety. Meanwhile, the quality of foundry coke has been stationary where, in fact, it has not deteriorated. Mr. L. W. Bolton in introducing a report on the subject to the annual meeting of the Institute of British Foundrymen,* placed consistency of properties spread over the year's deliveries as being of major importance. He also stressed the importance of shatter tests. During a session at the Management Training College at Ashorne Hill, organized by the British Iron and Steel Federation, it was reported that considerable capital expenditure in a scheme for hypothetical blast-furnace plant would be saved if there were insistence that the coke-oven manager should supply a product with a 90 shatter index. It would result in so much less coke being used that fewer coke ovens would need to be installed. Moreover, the speaker, Mr. W. Hunter, was speaking from practical experience. It appears that by intelligent blending of coking coals a quality of coke of this order can be achieved.

Elsewhere in this issue, is printed an Australian report of important full-scale (500 tons) tests on Densite or high-carbon coke. It was a pity in that case that a changeover to hot-blast caused the discontinuance of the tests, as they appeared to be very promising. The increased rate of production of liquid iron which was noted could in some cases be a valuable asset to a foundry. At least the coke seems to have the virtue of being consistent in quality.

A final step the foundry industry could take is to request the British Standards Institution to form a committee to ascertain whether sufficient information is available (or could be readily obtained) to formulate a quality specification for foundry coke. Should this be forthcoming, it should go far to implement Mr. Bolton's first requirement as to consistency, for it is well known that throughout the world good iron castings are made with coke having ash contents of anything between seven and 25 per cent. ash. In committee, the question of the imposition of the shatter test as a criterion of quality could be properly ventilated.

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* See page 211 of this JOURNAL.

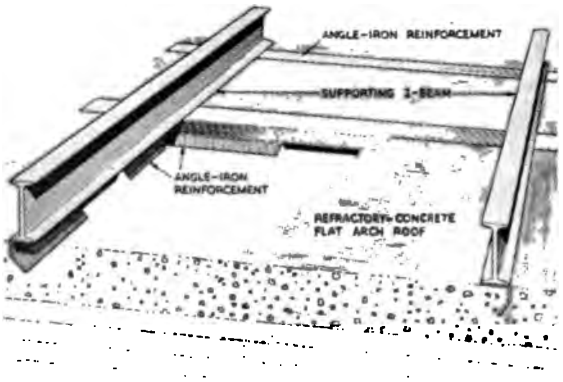


FIG. 3.—*Method of reinforcement in a cast-in-situ refractory-concrete flat arch roof.*

atmospheres containing some carbon monoxide at these temperatures should be free of iron compounds and, for this reason, refractory concretes made with the t.c.p.a. cement and an iron-free aggregate (*e.g.*, molochite, crushed H.T. insulating brick) are used. At much higher temperatures highly reducing atmospheres may attack the silica constituent in alumino-silica refractories, and a fused alumina aggregate should then be employed with the t.c.p.a. cement.

INSTALLATION

If the best results are to be obtained with castable refractories, it is essential that the basic principles of making ordinary concrete should be followed. For instance, the maximum size of the aggregate is governed to some extent by the minimum thickness of the unit or concrete being placed. Similarly, the aggregate should be evenly graded throughout the size range, and the amount of fine material passing a B.S.100 sieve should not exceed about 10 to 15 per cent. Aggregate with a deficiency of fine material is equally undesirable since the mix tends to be "harsh," with poor water-retention properties, which leads to compaction difficulties and a tendency to "bleed." Recommended mixes employing crushed firebrick are given in Table 3. Most of the other refractory aggregates are not available in the larger sizes and typical mixes are 1 vol. cement: 3-4 vols. aggregate (⅜ in. to dust), and 1 vol. cement: 2-3 vols. aggregate (⅛ in. to dust).

TABLE 3.—*Mix Proportions (by vol.) with Crushed Firebrick Aggregate and either Cement.*

Mix.	Cement.	Crushed firebrick.			Thickness of concrete or of mortar.
		Fine, ⅛ in. to dust.	Medium, ⅜ in. to ⅛ in	Coarse, ¾ in. to ⅜ in	
A	1	2	–	3	6 in. or over
B	1	2	2	–	2 in. to 6 in.
C	1	2½	–	–	2 in. or less

Apart from the main exception of silica brick, *a variety of refractory* or semi-refractory materials may be employed as aggregate. They should, however, be free from impurities such as slags or jointing materials, and the mixer and tools should be free of any Portland cement, lime or plaster, which may chemically affect the hardening properties of the cement. It is therefore often more convenient to use one of the various proprietary castables, which consist essentially of suitably graded aggregate mixed with the correct amount of cement and merely require the addition of water. Premixes of this type are distributed by many reputable refractory manufacturers.

Most of the commonly used refractory and insulating aggregates are, of course, porous and therefore require pre-soaking if the best results are to be achieved. Water should be added to the aggregates, and mixed either mechanically or by hand until the initial suction is satisfied. Usually, 4 to 5 minutes in a mixer is sufficient. Any excess water should be then drained off and the cement mixed with the soaked aggregate. More water may be added to bring the mix to the correct consistency, which should not be too "sloppy."

Although normal compaction by hand is adequate for many applications, a denser concrete of better quality is obtained when vibratory compaction is employed (*e.g.* by using poker vibrators or attaching vibrators to the metal formwork for *in-situ* work, or by using vibration tables for precast units). The use of vibratory compaction means that less water is needed, and the workability of the mix should be suitably adjusted. A mix which has the correct workability for hand-compaction usually contains too much water for efficient vibratory compaction. It is not possible to specify the exact amount of water required, since this varies according to the mix proportions and the grading of the aggregate employed.

Any "bleeding" from joints in form work or moulds should be prevented, and any porous material on which the wet mix is placed should be either given a preliminary soaking or oiling or covered with waterproof paper. After the mix has set, all exposed surfaces should be kept cool and wet for a further 24 hours if maximum strength is to be obtained. In many cases of emergency, however, satisfactory results are obtained when the concrete is put into service only a few hours after placing. For instance, emergency gunning repairs have been effected on hot refractory at 1,000 deg. C. Refractory concrete may be put into service immediately after the curing period, and the first firing should preferably be fairly slow in order to drive the water off gradually, but this is, of course, not necessary with subsequent heating and cooling cycles. It is only in selective applications, however, that special care has to be taken with the first firing since, in most cases (*e.g.* annealing furnaces, etc.) the rate of rise of temperature is not too rapid.

When steel reinforcement is used in refractory concrete it should be located in a zone where the temperature is not expected to exceed approximately 400 deg. C. since, above this value, the strength characteristics of the steel itself rapidly

Refractory Concrete in Foundries

(Continued from page 178)

By E. Hammond, B.Sc., Ph.D., A.R.I.C., M.Inst.F.

In concluding last week's article, the author deals with the advantages of castable refractories in the construction of electric, arc, fuel-fired and reverberatory furnaces. Summing up, he notes that the greater proportion of refractory concretes employed in foundries are based on the well-known grey high-alumina cement, since most of the larger installations do not require parts made from high-duty refractories.

ELECTRIC FURNACES

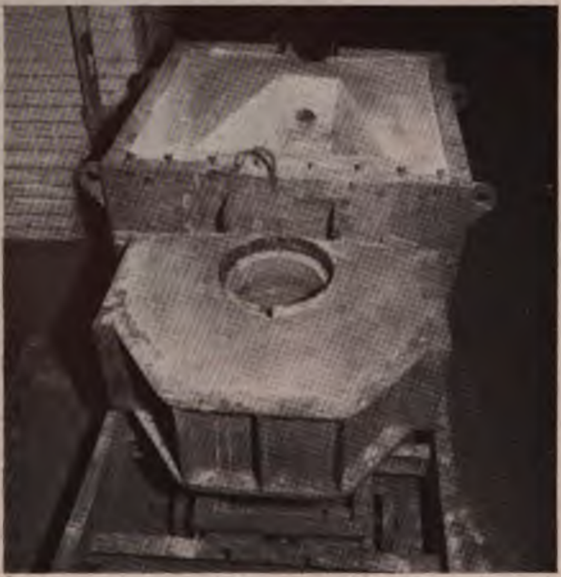
The introduction of the pure t.c.p.a. cement has resulted in the increased use of castable refractories in electric furnaces—particularly in all types of melting furnaces where high refractoriness, slag resistance, and non-reactivity with the metal is required. In the latter case particularly, it is essential to use an aggregate which is also free from iron compounds, *e.g.* molochite (*i.e.* fired china-clay), sillimanite and fused alumina. Perhaps one of the main reasons for the increasing use of refractory concretes in electric melting furnaces is the ease of casting complicated linings—in many cases they are replacing ramming mixes, because the quality of the lining is not so sensitive to installation techniques as the rammed lining, and the latter has also to be carefully dried and sintered (a procedure which may take a matter of weeks).

Induction Furnaces

The main failures of refractory linings in the core-type mains-frequency furnace occur in the region of the slot or channel, and are usually due to excessive attack by the metal or metal oxide (which enlarges the slot and reduces the electrical efficiency of the furnace), or cracking of the slot (which permits seepage of the metal to the coil or shield and necessitates shut-down). In general, therefore, the lining should preferably be monolithic, "slag" resistant, and capable of withstanding steep temperature gradients. The latter property may be correlated with good thermal shock resistance. Rammed plastic refractory linings are used extensively, but the subsequent life of the lining is very dependent on the technique of ramming and the care taken in the very slow processes of drying-out and firing the lining[5]. It is mainly for this reason that refractory concretes are being increasingly used, particularly for the smaller furnaces, where efficient ramming is difficult since the times for casting and pre-heating the lining are, if necessary, only a matter of hours and days rather than days and weeks. Nevertheless, the success of a refractory-concrete lining is still very dependent on correct casting and pre-heating procedures.

The mix should be of the correct workability for good vibratory compaction. Although compaction by ramming tools is employed, the use of small poker vibrators (or vibrators attached to the rigid steel former) is preferable, and certainly more efficient and quicker than ramming, particularly for small complicated castings. The pre-heating schedule permissible with refractory-concrete linings is extremely rapid compared with rammed linings. There is, however, one small but very important precaution which should be observed when the metallic former of the slot is used for pre-heating the lining by induction under reduced power—this is that the metal former should be wrapped in a material such as braid to allow for its expansion. It is, of course, important in this operation not to melt the former, since this would break the circuit, but the temperature attained is sufficient to burn off the braid. This braid wrapping is particularly advisable with refractory concretes, since they possess a high unfired strength due to the hydraulic bond of the cement, and do not possess the same amount of compressibility as an unfired ramming mix (which only develops appreciable strength after firing). Without the braid, the expanding metal former may cause incipient cracks or weak zones which only become evident during service. This pre-heat method is adopted extremely successfully in the installation of the lining shown in Fig. 15, the furnace being then put immediately into normal operation. A mix of t.c.p.a. cement/sillimanite is employed, and the furnace is used for holding s.-g. iron at a temperature of about 1,550 deg. C. The slot temperature is quoted as being in the region of 1,700 deg. C. The lining life is approximately seven weeks, five times better than that of previous linings of a ramming mix based on fused alumina.

Refractory and insulating concretes have also been used for the lid and lining of a new twin-coil Tagliaferri mains-frequency induction furnace of capacity 25 cwt., used for melting s.-g. cast-iron. The lid of this furnace has been lined with approximately 4½ in. of a t.c.p.a. cement/sillimanite mix backed by 2½ in. of high-alumina cement/vermiculite insulating concrete, and is giving extremely good service, even after some extraordinary conditions imposed on it during the first few weeks of service. A t.c.p.a. cement/alumina mix was used for lining the hearth of the furnace, and for a 2-in. protecting layer around the two vertical water-cooled coils in the bath. The hearth lining was very successful, but the 2-in. layer around the coils did not frit sufficiently hard, probably due to the water-cooling (the mix employed was, if anything, too refractory for this particular location). In view of the good service obtained with the t.c.p.a. cement/sillimanite concrete in other types of electric furnaces melting



(Courtesy: Hepworth & Grandage, Ltd.)

FIG. 15.—*Refractory-concrete (t.c.p.a. cement/sillimanite) lining of an induction furnace used for holding s.-g. cast-iron.*

s.g. iron, this type of mix is to be used in the future.

Various types of aluminium-melting induction furnaces are also lined with refractory concrete, *e.g.* EFCO, AJAX, Brown-Boveri, B.O.R.A. and Stein and Roubaix. The t.c.p.a. cement is normally employed with various aggregates (*e.g.* chamotte, alumina, and possibly zircon and olivine). For instance, EFCO-Lindbergh twin-chamber furnaces have been lined with a proprietory premix believed to consist essentially of the t.c.p.a. cement and olivine (magnesium silicate). With this lining some trouble appears to have been experienced due to the reduction by the aluminium of the silicate in the mix, resulting in a deposition of a hard material (probably mainly alumina) in the slot. In one case, therefore, a change-over was made to a silica-free aggregate (fused alumina). A mix of 1 vol. t.c.p.a. cement : 3 vols. fused alumina was employed for both the pre-cast slot unit (which was pre-fired up to 1,350 deg. C.), and for the remainder of the lining, *i.e.* furnace chambers. The lining was cast *in-situ* and compacted by rodding, and vibrators attached to the metal formers. The latter were stripped after four hours, when the lining was water-cured for 24 hours. The pre-heating was by charcoal fires in the furnace chambers, which gradually raised the temperature to approximately 1,000 deg. C.

The possible reaction of molten aluminium with alumino-silicate aggregate is, however, obviously not considered very important by one large firm, who use a t.c.p.a. cement/chamotte mix for lining approximately twenty induction furnaces of various types. In this instance, the pre-heating of the lining is first by electric heating, which in four hours raised the temperature to 110 deg. C. and maintains it for a further hour. The temperature is then raised to 500 deg. C. in four hours by a gas flame, and, after another hour at 500 deg. C., the lining is finally rapidly heated to 1,200 deg. C. by the gas flame and maintained at this temperature for a further two or three hours.

Refractory concretes do not appear to have been considered very much for lining brass-melting induction furnaces. This may be due to the fact that no serious problems appear to exist here[5]. Recently, however, the bath of an 800-lb. Birlec mains-frequency furnace for melting brass was lined with ordinary refractory concrete (h.a. cement/crushed firebrick). The ramming mix previously employed was rather friable at the bath temperature of 900 to 1,000 deg. C. and, in view of this comparatively low temperature, the amount of cement in the mix was increased to a little more than normal. The installation time was approximately 2½ hours, as against two days for the ramming mix, and the cost of materials was also reduced by approximately 70 per cent. In the Birlec-type of furnace with a "rectangular slot," pre-cast units made with a mix of t.c.p.a. cement/molochite are used, *e.g.* plugs for the horizontal portion of the channel and dampers which are inserted in the bath to control the metal flow. The problem of a satisfactory refractory lining in induction furnaces appears to be most acute when melting copper or cupro-nickel alloys. Cracking due to the relatively high temperature, and slot erosion (mainly by manganese oxide), which attacks siliceous refractory compounds), are the main problems. In view of the latter, aggregates such as fused alumina, fused magnesia and calcined magnesite would seem to be promising, although ramming mixes incorporating these materials have not apparently come up to expectations[6]. Trials with a t.c.p.a. cement/fused alumina mix have been carried out in an experimental furnace. The lining failed due to one vertical crack above the slot, but this may have been due to faulty installation (*e.g.* no braid wrapping around the slot former). Opinions vary on the desirable characteristics of this type of furnace, and it is interesting to note that the normal expansion properties of castable refractories may be varied by suitable choice of aggregate, or by the use of small quantities of refractory additive (as previously mentioned).

Refractory concretes do not appear to have been used quite as much in coreless stoves (mains and high-frequency) as in the core type. This is possibly due to the fact that the installation of ramming mixes is somewhat easier due to the simpler shape of the lining. The installation is, however, much simpler with castable refractories, and various methods may be employed[7]. A typical example is shown in Fig. 16 for a furnace melting aluminium (a t.c.p.a. cement/fused alumina mix was employed). A similar mix has been used for the plinth supporting the coil, and the lining of the coil, of a high-frequency furnace melting life of only two months, whereas a refractory-concrete door has so far given a life of over four years. In less frequent cases, doors are constructed with pre-cast refractory-concrete units. Such a door may consist essentially of nine tongued-and-grooved blocks (perhaps 3 ft. square and 9 in. thick) each block being keyed with four bolts wrapped in asbestos string.

Hearths and Bogie Tops

A smooth surface for hearths and bogie tops, undisturbed by partially displaced bricks, is of major importance in the handling of moulds, castings, etc., in and out of the oven. Although a monolithic bogie-top is often constructed, several users favour the employment of large pre-cast shapes, sometimes designed with interlocking joints, as shown in Fig. 6. The overall dimensions of this bogie are 14 ft. 3 in. by 6 ft. and the flues, visible at the top and sides, promote the circulation of hot gases around the furnace charge to obtain more uniform heating. A similar system is provided for in the cast-in-situ bogie top (approximately 33 ft. by 11½ ft. by 15 in. thick) in Fig. 7, shown in process of construction. The top was cast as follows: bottom 4½ in. insulating concrete (vermiculite aggregate); next 4½ in. semi-insulating concrete (equal proportions of vermiculite and crushed firebrick aggregate), and the top 6 in. refractory concrete (crushed firebrick aggregate). The top 6-in. layer was placed in sections approximately 2 ft. 9 in. by 1 ft. 6 in., with butt-joints as shown in Fig. 8. Refractory concrete only was used for the mould-stove bogey top (25 ft. by 10 ft. by 6 in.) shown in Fig. 9, although a h.a. cement/vermiculite insulating concrete was used for the 4½-in. lining of the door (12 ft. 6 in. by 13 ft.), also shown.

Owing to the unique expansion characteristics of refractory concrete, the butt-joints are closed at operating temperatures but open when the concrete cools to room temperature, when it is possible that they may become filled with sand. On reheating, the concrete expands to fill the contraction gap and any sand in the joint would tend to resist this movement particularly in view of the high expansion characteristics of silica sand. Normally, however, good service is obtained with the straight vertical butt-joints, but sand can be more easily removed (merely by blowing it out with compressed air) if the joints are of the shape illustrated in Fig. 10. Another method which has been adopted, at least in one instance, is where one joint approximately 2 in. thick surrounding the central area of the bogie top is filled with a lean mix of vermiculite concrete (approximately 1 vol. h.a. cement: 6 vol. vermiculite) which has sufficient elasticity to take up any expansion or contraction movements and, at the same time, prevent sand filtering in. This top again consists of a base of vermiculite concrete topped by refractory concrete (crushed firebrick aggregate).

Similar procedures are also adopted for the hearths of core stoves and annealing ovens and the concretes are normally cast-in-situ, although some users prefer a hearth constructed of pre-cast slabs. For instance, one annealing-furnace floor on which heavy castings were dragged had only six weeks life when constructed with standard firebricks. A much improved life was obtained by topping the floor with precast refractory-concrete slabs (*e.g.* 3 ft. by 2 ft. by 4 in. thick). Slabs of this type should be laid on a flat level base to avoid proud joints, with all edges in contact so that the joint thickness is negligible.

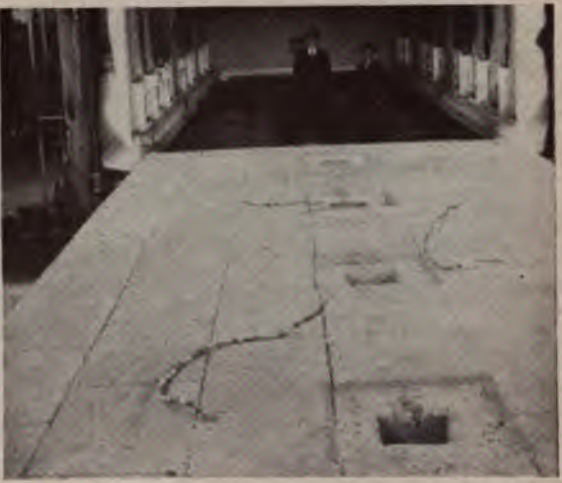
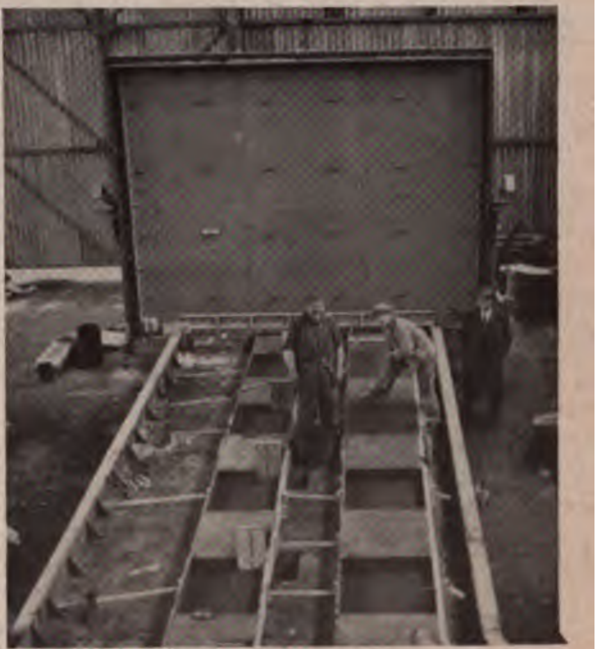


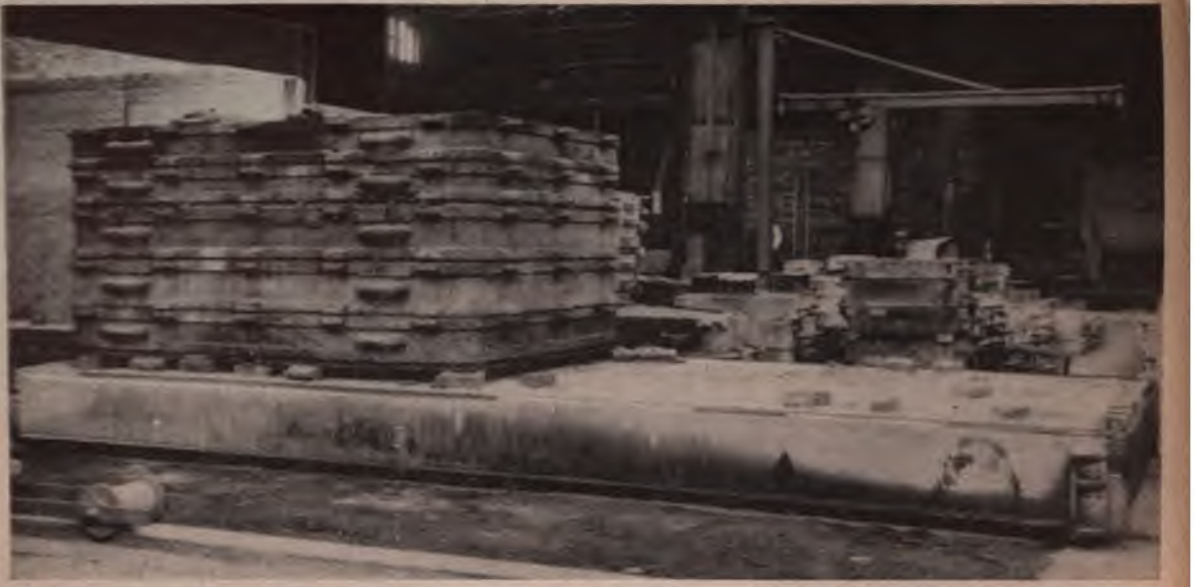
FIG. 7.—*Cast-in-situ bogie-top of refractory- and insulating-concretes.*

Arches

Owing to its suitable thermal properties and lightness, insulating concrete is more often employed

FIG. 8.—*Method of constructing a cast-in-situ bogie-top in chequer-board fashion to obtain butt-joints.*





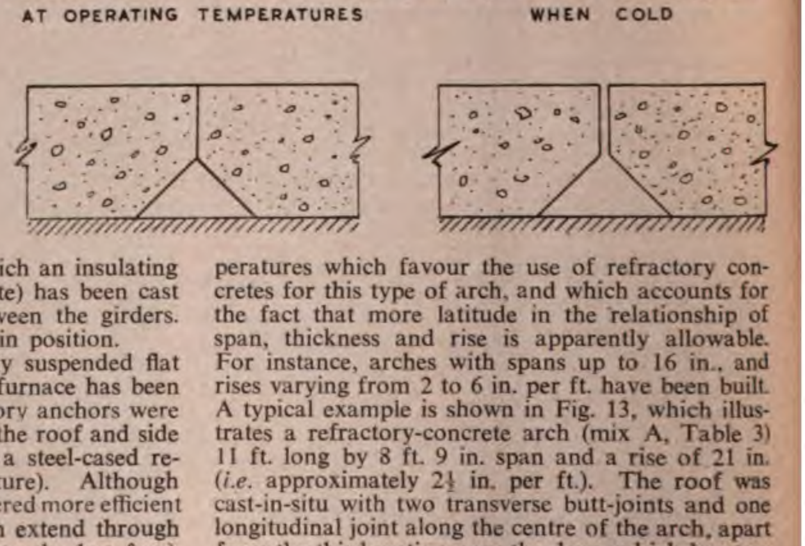
(Courtesy: Atlas Steel Foundry.)

FIG. 9.—*Cast-in-situ mould-stove bogie-top, constructed by using both refractory- and insulating-concretes.*

for the flat roofs of core stoves or annealing furnaces, and in this country the method of construction employing partially embedded heavy reinforcement (see Fig. 3), is favoured. Roofs of this type have been found to be still in good condition after almost 20 years' service. The example shown in Fig. 11 is interesting, since the reinforcing steel members are fully embedded. Although this is permissible for core stoves owing to the relatively low operating temperature this lack of provision for cooling the steel should *not* be adopted for annealing furnaces, etc., operating at higher temperatures—part of the steel should be exposed to the atmosphere, as shown in Fig. 12, in which an insulating concrete roof (vermiculite aggregate) has been cast on corrugated sheeting slung between the girders. In some cases, the sheeting is left in position.

The method of installing a fully suspended flat roof (see Fig. 4) for an annealing furnace has been fully described[4]. Steel and refractory anchors were employed in this furnace for both the roof and side walls (*i.e.* the whole furnace was a steel-cased reinforced insulating-concrete structure). Although refractory anchors may be considered more efficient than steel "claws" (since they can extend through the full thickness of the concrete to the hot face), they are more expensive, and practice indicates that properly designed steel reinforcement alone is satisfactory for suspended arches in furnaces operating below, say, 1,100 deg. C.

FIG. 10.—*Method of constructing butt-joints to facilitate removal of sand, etc.*



Although flat furnace roofs are the modern trend, refractory and insulating concretes have, of course, been used for many years for constructing the normal type of sprung arch. The two main properties causing the vertical and horizontal stresses in a sprung arch are the weight and expansion of the refractory. Apart from any advantage gained by monolithic construction, it is the comparatively low weight and negligible expansion at operating temperatures which favour the use of refractory concretes for this type of arch, and which accounts for the fact that more latitude in the relationship of span, thickness and rise is apparently allowable. For instance, arches with spans up to 16 in., and rises varying from 2 to 6 in. per ft. have been built. A typical example is shown in Fig. 13, which illustrates a refractory-concrete arch (mix A, Table 3) 11 ft. long by 8 ft. 9 in. span and a rise of 21 in. (*i.e.* approximately 2¼ in. per ft.). The roof was cast-in-situ with two transverse butt-joints and one longitudinal joint along the centre of the arch, apart from the third section near the door, which has two

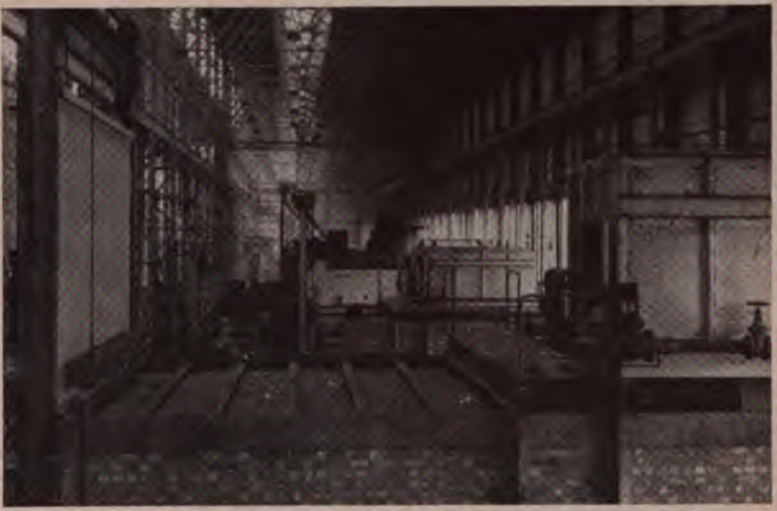


FIG. 12.—*Reinforced insulating-concrete (vermiculite) flat roof of an annealing furnace which was cast on corrugated sheeting slung between the girders.*

(Courtesy: George Richards & Co., Ltd.)

longitudinal joints at the third points. The furnace is employed for annealing malleable iron at a maximum temperature of 1,050 deg. C. with a 90-hr. working cycle, and it is interesting to note that, although the refractory concrete arch is the same thickness as the firebrick arch previously installed, the heat losses have been decreased to such an extent that it has not been found necessary to place the customary 9 in. of sand on the top of the arch.

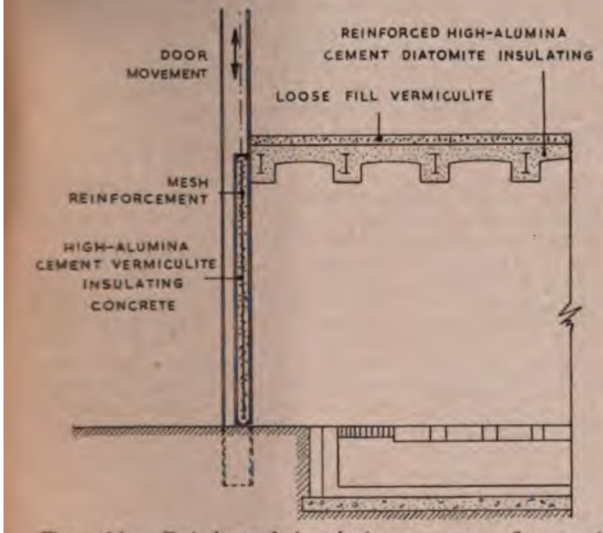

DOOR MOVEMENT
REINFORCED HIGH-ALUMINA CEMENT DIATOMITE INSULATING
LOOSE FILL VERMICULITE
MESH REINFORCEMENT
HIGH-ALUMINA CEMENT VERMICULITE INSULATING CONCRETE

FIG. 11.—*Reinforced insulating-concrete flat roof and door of a core-drying stove.*

As in other applications, arches are often constructed of precast units. The arch ribs are usually approximately 2 ft. thick by 2 ft. wide with a 6-in. span, and even larger ribs weighing over three tons each have been used in the arch of one large annealing furnace—the hearth and flues incorporated in it were constructed with insulating concrete (crushed H.T. insulating brick aggregate). It is also now common practice to use refractory-concrete springers in orthodox brick arches. An interesting development of this was incorporated in a heat-treatment furnace, where the springers consist of 12-ft. long steel ducts encased in refractory concrete and thus serve as air pre-heaters.

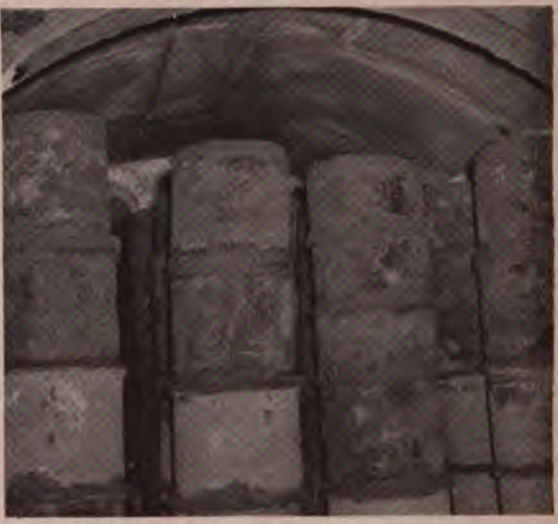
Insulating concretes are favoured for lining the covers of "Top Hat" or bell-type annealing furnaces, and the lining is often installed by the "gunning" technique using, of course, suitable mesh reinforcement. Refractory concrete is, however, preferred for the hearths.

Fireboxes and Burner Blocks

The burning rate in solid fuel-fired core-stove fireboxes is relatively low, and ordinary refractory concrete (h.a. cement/crushed firebrick) is therefore sufficiently refractory and, in practice, gives very good service as linings, arches, etc. In one interesting application, the firebox roof, of span 2 ft. 9 in., was flat and constructed of precast interlocking refractory-concrete lintels. These proved satisfactory, but since very light cracking occurred holes were cast in the lintels to take steel rod as a precautionary measure. It is now standard practice to

FIG. 13.—*Cast-in-situ refractory-concrete arch (h.a. cement/crushed firebrick).*

(Courtesy: T. H. Mold & Son, Limited)



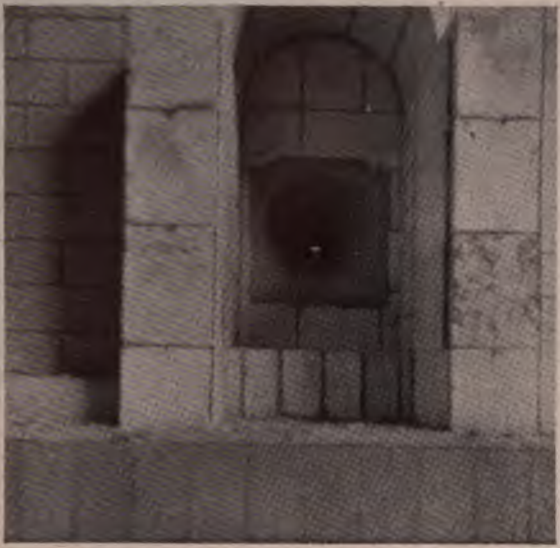


FIG. 14.—*Detail of one of the* 16 *refractory-concrete burner-blocks in the annealing furnace shown in* FIG. 7

cast all types of burner blocks and the mix employed is, of course, dependent on the type of burner, operating temperature, etc. Ordinary refractory concrete (high-alumina cement/crushed firebrick aggregate) is frequently used for casting the oil burners of annealing furnaces, etc., but in certain instances the pure t.c.p.a. cement has been employed to obtain increased refractoriness. For instance, this cement (with a chamotte aggregate) was used for casting the sixteen burners of the annealing furnace shown in Fig. 7. The blocks are shown in greater detail in Fig. 14.

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[2] B.P. 646,524 (1950).
[3] B.P. 646,534 (1950).
[4] Witschey, R. A., *Foundry*, 1949, **77** (9), 80.

(*To be continued next week.*)

Scrip Issue proposed by Acrow (Engineers)

Proposal to make a one-for-seven scrip issue in "A" shares is announced by Acrow (Engineers), Limited, structural engineers and builders' plant manufacturers, of London, W.2. A year ago holders received one new for every six ordinary shares held.

In June, when the company made an offer for the shares of Hardwick Industries, Limited, the directors anticipated paying not less than 40 per cent. for 1958-59. It is now learned that by raising the final dividend from 10 per cent. to 12½ per cent. a total (with the quarterly interims) of 42½ per cent. for the year ended March 31, 1959, will be paid on increased capital against the equivalent of $30\frac{2}{7}$ per cent.

Consolidated trading profits amounted to £675,423 *(£636,555) and the net profit is* £309,005 (£240,619).

Iron *v.* Plastic Gas Mains

Correspondence in recent issues of *The New Scientist* has discussed the respective claims of cast-iron and plastics as materials for underground mains. In the course of one letter, an engineer concerned with the laying and maintenance of gas mains for 36 years, expressed the view that "gas distribution engineers will require longer experience of the use of plastic pipes before they feel that they can partially replace cast-iron pipes by them, even in the smaller sizes. When I made careful inquiries a year or two ago as to the general feeling in this matter in the USA," (the writer continues) "I learnt that no type of plastic pipe was considered suitable for conveying manufactured gas containing aromatic hydrocarbons, due to the softening effect of these on the material. I note from the report of the Committee for the Study of New Gas Distribution Techniques, given at last year's conference of the International Gas Union in Rome, that this view is maintained. I also had a number of types of plastic pipes tested over long periods under laboratory conditions which confirmed this view. P.V.C. was found to give the best results having regard to this feature, but it was not found to be suitable for conveying gas which had not been stripped of benzol.

"Another feature which has to be borne in mind is that plastic pipes can be readily deformed, and this is of importance when considering the depth at which mains have sometimes to be laid involving pronounced external loading, and the heavy vehicular traffic that has to be carried by carriageway, and sometimes vicariously by footway surfaces under which the mains are laid.

"It is also necessary to take into account the widespread use of mechanical trench diggers, and the fact that pipe trenches so dug are often not 'bottomed up' as carefully as in the past. Many engineers, gas and otherwise, hold the view that plastic materials gradually take a set under load. A further point is the liability of plastic pipes to be more easily affected by subsequent excavations than iron pipes.

"The last point I would refer to is that plastic pipes have a coefficient of linear expansion about eight times or so greater than that of iron, and experience has to be obtained as to what effect, if any, this may have on the technique of main-laying.

"Gas engineers have had more trouble with the corrosion of steel service pipes than with cast-iron main pipes, and I think that they are wise to get comprehensive experience of the use of plastic pipes for service laying before using them for main-laying work."

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* Extract from a recent *Bulletin* of the Council of Ironfoundry Associations.

Industrial Production Index

Manufacturing industry, notably the consumer goods trades, is thought to have accounted for a large part of the further increase in industrial production in July. The index, seasonally corrected, reached a new record level at 111-112 (1954=100). This is 1 to 2 per cent. above the second quarter average and 3 to 4 per cent. above the first quarter.

The index, which was 106 for July, 1958, reached 107 in January and February and, after standing at 109 for the next three months, is confirmed by the Treasury at 110 for June. The index for mining and quarrying in June was 97, compared with 92 in the same month last year; for manufacturing it was 115 (110), and for gas, electricity, and water, 104 (101).

um-melting at the Works essop-Saville, Limited

In recent years there has been a continually increasing demand for new and better materials, to keep pace with the needs of design engineers. This has long been recognized by Jessop-Saville, Limited, of Sheffield, who have concentrated on a programme of intensive research into the development of new alloys and new metals. These investigations have led to the introduction of new processing techniques, one of the most outstanding being that of melting in vacuum.

ıtroduction of the vacuum-melting process
ıp new horizons for the study and produc-
completely new range of metals and alloys
ıust be essentially melted in the absence of
rticular examples of these metals are tita-
d zirconium. It was, however, found that
ıum-melting process would also consider-
prove the characteristics of many existing
nd in fact allow the production of new
els which could not be made by any other
The two methods adopted by Jessop-
Limited, of Sheffield, for vacuum-melting
consumable electrode arc-melting process,
high-frequency induction-melting process.

Initial Developments at Jessops

in 1956 the Jessop vacuum-melting plant
to full-scale operation. The melting fur-
vere of the consumable-electrode type,
of producing titanium ingots with
s up to 20 in., and up to 1 ton in weight.
me prior to this a small 20-lb. vacuum-
n-melting furnace had been installed for
development work. It
n realized that, with the
ng demand for these
ıterials, the plant would
tisfy all requirements,
arly for the larger
, and the decision was
to increase production
. The new Heraeus
able-arc melting fur-
as now been installed
fully operational. This
ble of melting titanium
of up to 24 in. dia.,
g more than 2½ tons.
ently installed, and now
perational, is a new
Wild Barfield/NRC
quency induction-melt-
ace. These furnaces in combination are claimed to make up the largest operational vacuum-melting plant outside America.

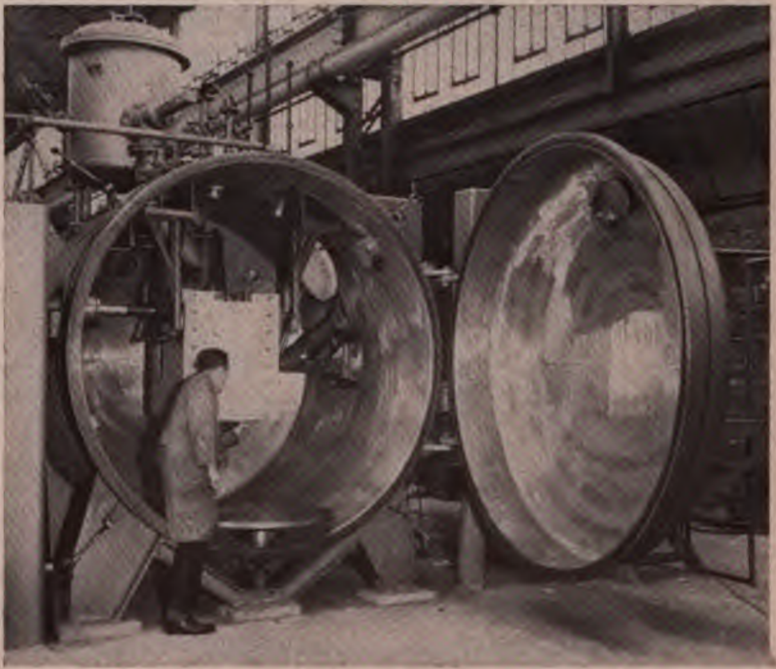
Potentialities of Vacuum-melting

Freedom from Non-metallic Inclusions

Vacuum-melting will not satisfy all the demands the engineer makes on the metallurgist, but it does represent a considerable advance in many metallurgical problems. Turbine and compressor-disc materials, used in gas-turbine aircraft engines, must be virtually free from non-metallic inclusions. Vacuum-melting can not only ensure this, but also provide the designer with enlarged scope for even more highly-stressed conditions. This freedom from non-metallic inclusions also means that the transverse ductility of forged discs is improved. Tensile tests on vacuum-melted 12-per-cent. chromium-steel discs have, for instance, given elongation values four times greater than those obtained from discs made from air-melted material.

Reduction in Gas Content

Vacuum-melting reduces the total gas content of the metal. Tests with air-melted steel have shown



.—*Wild Barfield/NRC*
quency vacuum-induc-
lting furnace at the
f Jessop-Saville, Limited,
field.

that remelting in vacuum reduces the total oxygen, hydrogen and nitrogen content of the steel from 600 to 200 parts per million. This feature of the process is particularly useful in the production of stock for precision castings, or for remelting prior to precision casting, for in this way undesirable blow-holes and gas pockets can be avoided. The production of certain steels with low-hydrogen content minimizes the need for the long immunization heat-treatments which are necessary to avoid the danger of hair-line cracking.

Fresh Fields of Development

Induction-vacuum melting has made possible the production of alloys which, because they contain elements which readily oxidize, could not formerly be produced by conventional air-melting methods. This new technique has also opened up fresh fields in the development of high-temperature materials. One such alloy, Jessop G.64, contains high percentages of aluminium and titanium, and can only be made satisfactorily in a vacuum-melting furnace. It has excellent high-temperature properties, and is being assessed for stator and turbine-blade applications. The advent of nuclear-power plants has posed further problems for the metallurgist in the demand for new materials. One of these materials is zirconium, which can only be produced by vacuum-melting. Jessops are developing a range of zirconium alloys, some of which are already in commercial production. In many nuclear applications it is essential that certain tracer elements in steel be reduced to an absolute minimum. The vacuum-melting technique permits close control of the chemical composition of every melt, and enables certain elements to be completely removed, and others kept to the specified minimum.

Wild-Barfield Melting Unit

The Wild Barfield/NRC 600-lb. vacuum-induction melting unit at Jessop's is shown in Fig. 1. It is designed for semi-continuous operation, provision being made to accommodate sufficient ingot-moulds for several heats on the rotary mould-table. The furnace may be charged through a bulk-charging hopper without breaking the vacuum in the melting chamber,

Stainless-steel Vacuum-chamber

The principal unit of this installation is a horizontal vacuum-chamber, constructed of stainless steel, approximately 7½ ft. in dia. by 9 ft. long. The end of this chamber is sealed by a hinged door; the whole of the chamber and door is water-cooled through copper coils brazed to the outside of the unit. This chamber contains the high-frequency induction-melting coil, which is designed to tilt about the pouring axis, and immediately in front of and below the furnace there is a rotary mould-table which allows several ingot-moulds or castings to be poured from one melt. Provision is made for the observation of all stages of the process through three observation windows, each one equipped with shields and wipers.

External Controls: are provided for the following

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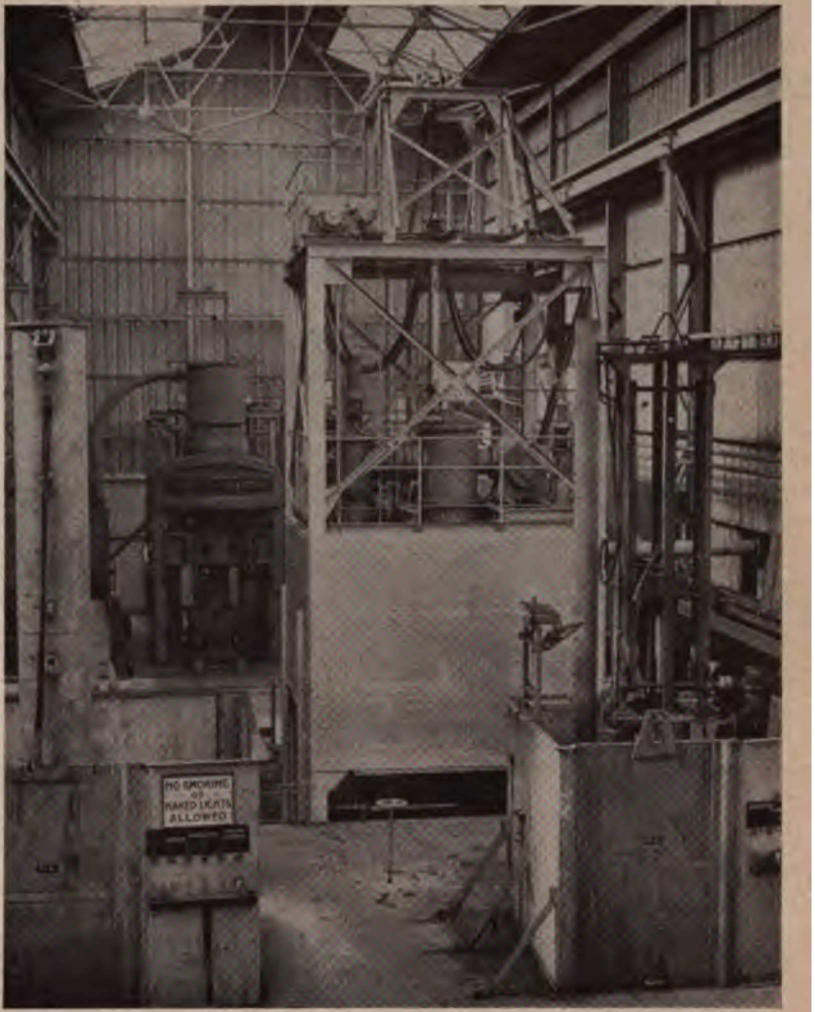

FIG. 3.—*The Heraeus consumable-arc vacuum-melting furnace at Jessop's.*

without breaking the vacuum in the main tank, by closing the 6-in. dia. vacuum lock. A special pumping line is provided to evacuate this chamber after it has been recharged with material.

Pumping System

The pumping system is designed to handle the gases from the 600-lb. molten charge during melting, purifying and alloying. The pumps have the necessary capacity for disposal of the gases as they are given off from the melt. Pneumatic operation is provided for all the vacuum valves used during the pumping cycle. The vacuum system consists of a large 16-in. dia. high-vacuum manifold and a 6-in. dia. rough-pumping line connected to the end face of the melting chamber, to give rapid and complete evacuation of the chamber. This combined system can evacuate the furnace chamber from atmospheric pressure to a pressure of one micron of Hg in 15 min. Vacuum gauges indicate the furnace tank pressure, from 1 micron to atmospheric pressure. The vacuum instruments consist of one alphatron gauge, and a five-point thermocouple vacuum gauge. Operating platforms are provided for easy access to the controls and observation windows. The control panel for the electrical and pumping systems is mounted on the main operation platform. The power supply for the melting is a 200-kw. motor alternator set, working at 400 v. and 3,000 cycles per sec. The furnace is to be used for melting iron, nickel and cobalt-base alloys.

Heraeus Arc-melting Furnace

The Heraeus consumable arc-melting furnace (shown in Figs. 2 and 3) consists of a large vacuum-tight vessel evacuated by pumps which are capable of handling large volumes of gas at high vacuum. The actual melting is carried out in the copper crucible which forms the lower half of the furnace. An electrode is placed inside the furnace, where it is welded onto the feeder rod under high vacuum conditions. The electrode can then be driven up or down, to control the melt, by applying drive to the feeder rod. This feeder rod also carries the melting current, through sliding vacuum seals, from the electrical busbars down to the electrode.

Melting

The melt is started by striking an arc between the bottom of the electrode and a small charge placed at the bottom of the crucible. The heat generated by the arc provides sufficient heat to melt the tip of the electrode. Molten metal sprays down to form a pool which, when solidified, forms the ingot. As the molten pool is only of small dimensions great care must be taken to ensure that melting conditions are kept constant throughout the melt. A view of the melt is projected onto the melting control-deck alongside the many electrical gauges. The melting operator here is able to assess the furnace conditions and make any necessary modifications.

Automatic Controls

The furnace components (pumps, valves, etc.), are actuated remotely from a control cabinet. There is provision for automatic operation of all vacuum equipment, so that when the furnace is closed evacuation continues through all its stages entirely without supervision. This automatic

Vacuum Melting at Jessop-Saville

system also safeguards the vacuum equipment in cases of component failure. For safety, the arc current is interlocked to all operations which, if faulty, could lead to dangerous conditions. A section of the cabinet is given over entirely to indication of possible breakdowns, so that rapid rectification can be made. An electrical control unit drives the feeder rod as required by the melt. Arc gaps can be maintained within fine limits when using this unit at maximum sensitivity, and it is possible to apply a current of 18,000 amps. to the electrode. The vacuum equipment is capable of holding melting-pressures below one micron. In this pressure range, the arc is very stable. There are two pumps fitted for the final evacuation of the furnace (a roots and a booster pump). Their combined speeds are: four thousand litres per sec. for air, and ten thousand litres per sec. for hydrogen.

The titanium ingots produced range from 9 in. dia. (120 to 420 lb.) to 24 in. dia (2½ tons). The plant is capable of producing zirconium ingots, but it is likely that initial production will be confined to ingots up to 800 lb. in weight. Steel ingots up to approximately 3 tons in weight can also be produced in the same sizes.

Offer for Webley & Scott

Preliminary information concerning operations for the 15 months ended March 31, 1959, has been made available to assist shareholders of Webley & Scott, Limited, Birmingham engineers and machinists, to come to a decision regarding the offer by Arusha Industries, Limited. Group net profit amounted to £46,274 and the balance for distribution is £24,589 after deducting pre-acquisition profits and retentions by subsidiaries.

Preference dividends of £1,756 and ordinary interim dividends totalling 12½ per cent. absorbing £16,676 net have been paid and no further dividend is recommended for the period. Consolidated net assets applicable to ordinary shareholders amounted to £691,000. Indebtedness to bankers on March 31 was £548,156, but this has increased to over £600,000 on August 31. The directors reiterate that in all the circumstances they remain convinced that association with Arusha under the terms of the offer (which is now unconditional) cannot but result in benefit to the company.

Franco-British & General Trust, Limited, which asked for further explanations of the board's recommendation of the Arusha offer, has been informed that association with a large group would offer much wider benefit to shareholders. The chairman of Webley & Scott, Mr. R. E. G. Windsor, has agreed on behalf of the Windsor family to accept the Arusha offer.

Largest Propeller in New Alloy ?

At the end of last month, what is believed to be the largest high-tensile nickel-aluminium-bronze (BS.1400-AB2-C) propeller ever cast in the world, left the foundry of Lips, N.V.Drunen, on its way to Verolme's United Shipyards at Housden, *en route* to Dunkirk, via Rotterdam.

The propeller has a diameter of 25 ft. and a weight of 38 tons. At Dunkirk, it is to be fitted to a single-screw 72.600-ton tanker being built by Ateliers et Chantiers de France to the order of Tidewater Oil Company. The tanker which is 860-ft. long is reported to be the largest ship ever built in a French yard. Road transport was arranged on a special 16-wheel trailer. (It is interesting to note that this propeller is larger than those on the Queen Mary, as she is a four-screw ship.)

Air-pollution Control

By Donald S. Fraser

Extracts culled from discussions, held at the recent National Conference on Air Pollution in the USA, on "accomplishments by the steel industry." Many recent developments in dust-extraction are described, and various "emission problems" are commented upon.

The National Conference on Air Pollution, which was held recently in Washington, D.C., USA, brought to light many interesting aspects of what has been accomplished by the steel industry in the United States with this vital problem. Whilst individual companies have for many years spent money on smoke-abatement research, the American Iron and Steel Institute only became actively interested in 1950. In that year the Institute signed a contract with the Industrial Hygiene Foundation of America at Mellon Institute to pursue work in air-pollution abatement. At that time, conditions in the field were less than ideal. It was difficult even to define the problem to be solved, since there had not yet been developed simple, effective and inxpensive instruments which could take a sample that was truly representative of either the ambient atmosphere or of stack gases. The Mellon group developed instruments and techniques which were useful in these fields.

Instruments Developed

Amongst the instruments developed was an automatic smoke-filter, which samples the atmosphere for successive short-time periods (measured in hr.), and which permits the tracing of variations in smoke intensity, which are largely due to weather, thus making possible comparisons between different districts, and between different seasons. A hydrogen-sulphide sampler (which continuously monitors the atmosphere) and an instrument for measuring hourly dust-fall rates with a high degree of precision were also developed. Coupled with the introduction of the instruments was the development of the techniques required for their utilization. At the same time a research programme on stack-sampling was carried out.

Training School

A training school was set up to which various members of the American Iron and Steel Institute sent representatives to be trained in the techniques used in air-pollution studies. It was at this school that existing cleaning equipment was critically examined, with a view to classifying it into groups of optimum usefulness. No single device was found which could do all the things necessary to meet air-cleanliness requirements. An attempt was then made to develop a new type of filter device which would fit into the metallurgical stack-gas cleaning programme, and after studies of various filtering devices were made a new type of continuous self-forming filter was devised from slag wool revolving in a horizontal plane.

The filter combines in one device the versatility of a scrubbing or washing device for gases, with the high efficiency of a fibre filter for particulate matter. Mineral wools withstand temperatures greater than 538 deg. C., permitting their use on flue gases and furnace effluents. The wools being used are made from blast-furnace slag, are reusable many times, and give efficiencies greater than 90 per cent., it is claimed.

Continuous Progress

Research is going ahead to seek means to control particulate emissions from Bessemer converters, and to endeavour to prevent the formation of fumes in the metal bath. Fortunately, however, this type of steel producer is rapidly disappearing in America, and smoke-control authorities are expecting attrition to solve this problem. Over the years, the American steel industry has been searching out the most obvious air-pollutants and correcting them, wherever possible. Many steam boilers have been converted from coal- to gas-firing, and many process-heating furnaces converted from coal-firing to natural-gas-firing, or to electric heating.

EMISSION PROBLEMS

The raw material used in largest quantity by the steel industry is air. During the production of 100,000,000 tons of steel, from raw materials to finished products, 1 billion tons of air is used and must, of course, be returned to the atmosphere. In many cases it contains both coarse and fine particles. These particles originate in the mechanical and chemical reactions of hot gases in the in-process materials inside sinter machines, coke ovens, blast furnaces, melting furnaces, converters, soaking pits or on scarfing beds; or from chemical reactions, agitation in a molten bath and combustion of fuels.

Coke Ovens

Coke ovens have been, and are, sources of smoke, and the problem of the emissions at the time of pushing and of quenching the coke is still to be dealt with. Improvements in design have resulted in built-in equipment to shorten the time of charging, vacuum-charging equipment to ensure minimum emissions during charging, equalizer mains, and self-sealing doors, all of which have had a good effect.

Blast Furnaces

Blast furnaces produce about 150,000 cub. ft. of gas per ton of iron melted. The gases produced are all cleaned to comfortably meet the 0.40 lb. per 1,000 lb. of gases required by many control boards. There is, of course, recoverable gas of approximately 90-B.Th.U.'s heat value. A large number of protective devices have been added to blast furnaces in recent years, and in many cases the cleaned burned gases emit less than 10 lb. of dust per ton to the atmosphere. The dust-catching equipment on blast furnaces is varied and costly, and almost all types are employed, including venturi and orifice scrubbers, tower washers and electrostatic precipitators.

" *Slips* "

Occasionally a blast furnace " slips," that is its burden shifts downward rapidly, thus opening safety-bleeder valves to relieve pressure. When this happens, some dust is ejected into the atmosphere, or the top will blow off the furnace. However, " slips " have been reduced by improved ore burdens and practices. In many cases bleeders have been installed on the clean-gas side of the blast-furnace gas-cleaning system, which prevents the dirty gas from escaping.

Open-hearth Furnaces

The effluent from open-hearth furnaces represents the industry's largest and most persistent problem. The results of research to date indicate that precipitators, high-energy scrubbers, or filters may be required. Installations presently operating on open-hearth gas-cleaning employ waste-heat boilers to reduce the gas temperature, and electrostatic precipitators to do the cleaning. On many furnaces automatic combustion controls have been installed to control the fuel-to-air ratio, which results in more complete combustion and consequently less effluent. The new basic oxygen steelmaking process has required special equipment to suppress effluent. This has been done very successfully by the use of spark traps, and wet washers (such as disintegration and high-energy scrubbers) followed by moisture eliminators.

" Bag-houses "

Electric furnaces have had their share of attention. The most popular type of air-cleaning device in use on electric furnaces is the " bag-type " (in effect a giant vacuum-cleaner). Dusts from an electric furnace carry all smoke from the melting operation to a four-room building known as the " bag-house." In one new installation there are 195 dacron bags (fifteen ft. long and six in. in dia.) in each room. These bags collect the dust from the air which passes through them. Once an hour one room at a time is shut down automatically, and the bags shaken vigorously. The dust from the bags falls into a collecting hopper, where it is mixed with water to form sludge which is settled and dumped. This installation, which can also be used on the basic oxygen process, has a very high efficiency.

Ferro-manganese Furnaces

Ferro-manganese furnaces produce an effluent which, if unchecked, is the most prolific of any of the metallurgical processes. By means of electrostatic precipitators particulate matter is recovered from the effluent. This matter is then treated by roasting, and finally put through a process of briquetting before being sent to the dump. There is no economical recovery of this material, and the only compensation is that the cleaned effluent gases can be used under boiler-house furnaces (although they have a B.Th.U. value of only 120).

Improvements Already Made

Many other operational units of the American steel industry have been safeguarded. Boiler houses have been equipped with electrostatic precipitators, and raw-material preparation has reduced dust considerably. Water sprays have been installed on car dumpers at ore- and coal-handling facilities. Sinter plants have been protected by cyclone cleaners, and water sprays on cooling tables. Scrubbers have been installed on coal pulverizers and coal washers. Soaking pits have been protected by waste-gas controls. Scarfing beds and scarfing machines have been equipped with cyclone dust-catchers, electrostatic precipitators and wet washers.

CONCLUSION

This article has sketched only the outlines of what has been done—many old problems remain, and new ones will arise. There is much research and development in progress, and the American steel industry is attempting to solve all problems pertaining to air pollution as speedily as possible. Mr. Max D. Howell, executive vice-president of the American Iron and Steel Institute, has said: " We hope that we shall be permitted to work out the solutions to our problems without being hampered by restrictive legislation, which can have little grounding in reality until the state of the abatement art is more advanced than it is to-day." [This last sentiment will undoubtedly be regarded somewhat ruefully by UK founders, who have already experienced considerable difficulty in implementing the requirements of the Clean Air Act.—EDITOR.]

A NEW COMPANY -Renault Machine Tools (United Kingdom), Limited --has been formed to take over production and marketing of the Renault machine tools for automation, previously manufactured in Britain under licence by Sentinel (Shrewsbury), Limited. The new company is operating temporarily from the Sentinel Works in Shrewsbury until other accommodation in the town is ready—probably in the autumn. The board comprises four French directors and two *executives* from Sentinel (Shrewsbury).

NEW PRIVATE COMPANY—Joseph Lucas (Group Services), Limited—has been formed within the Joseph Lucas (Industries), Limited, organization. It will " make, do, or provide such arrangements, things, and services " to enable the parent, associated, and subsidiary companies to be carried on economically and profitably, or to promote their success, etc. The company was registered on August 21 with a capital of £100 in £1 shares. The subscribers are Mr. F. Garner and Mr. P. A. Bristow, both of the parent company.

Australian Symposium on Foundry Coke

A two-day symposium on "Production, Properties and Utilization of Foundry Coke" was held during the spring of this year in Sydney, N.S.W. It was staged by the Coal Research Section of the Commonwealth Scientific and Industrial Organization, some 60 representatives of industry being present. Two of the papers were of particular interest to foundrymen, and are summarized in the following article.

The first paper presented at a recent symposium, in Australia, on foundry coke dealt with the effect of prolonged storage on the carbonizing properties of high-volatile coals—a subject which is rather remote from foundry interests. The second, presumably of Russian origin, "Thermo-mechanical Properties of Metallurgical Coke" by Mr. P. A. Scukin, was presented by Dr. K. F. Baker. The main conclusion arrived at was that the higher the strength of a coke at room temperature, the higher will be its strength at the temperature of the blast furnace. However, Dr. Baker pointed out that recent work in the USA had led to the opposite conclusion, namely, that it was impossible to predict the behaviour of coke at elevated temperatures from measurements of its mechanical strength at room temperature. The third paper was of considerable interest to founders, and is abstracted below.

High-carbon Coke

By A. Dahlmann

(Paper presented by H. R. Brown.)

A patented substitute for foundry coke prepared from a mixture of anthracite, coking coals, and a liquid by-product of petroleum refining, which was developed a few years ago in the USA under the name "Densite," has given good results for cupola use in Germany and more recently in Australia. It is of lower ash-content, lower porosity, higher true and apparent density, and greater average cell-wall thickness than conventional foundry coke. Tests show that, using Densite coke graded 60 to 80 mm., the same melting result is obtained with about 30 per cent. less carbon than with ordinary foundry coke. However, Densite offers no substantial advantages where foundry coke of high quality is available and the cupola can be operated under optimum conditions, *i.e.*, producing maximum iron temperature for a given coke charge.

Densite gives higher carbon pickup, and a reduction in refractory burnout and wear of the cupola lining, as compared with ordinary foundry coke. The greater the distance of the foundry from the coke-making plant the more attractive is the use of Densite, because, as transportation costs increase, the financial advantage of being able to produce the same amount of cast-iron with a smaller quantity of coke increases. Circumstances where it would be economically advantageous to change over to Densite include: (*a*) where time is limited and high melting rates are, therefore, essential (*b*), where there is little storage space for coke, and (*c*) where supplies of ordinary foundry coke are subject to wide variations in quality.

The results of full-scale tests of Densite at a large Australian foundry have shown that it has the following advantages (in addition to those already mentioned) over ordinary foundry coke: higher melting rates; a reduction in the limestone charge, due to the lower ash content of Densite, and longer periods of continuous operation.

DISCUSSION

MR. GREENBANK (Malco Industries) opened the discussion with some comments on the size of cupolas in relation to their performance. He mentioned a foundry, engaged in the manufacture of malleable-iron castings, where the cupolas operated at a temperature of 770 deg. C. just below the charging door, this door being about 12 to 15 ft. above the tuyeres. The corresponding figures for overseas practice were 315 to 480 deg. C. and 20 to 30 ft. What was the reason for the higher cupola stacks used overseas, and what was the optimum height?

Replying, MR. BROWN said that for maximum thermal efficiency it was essential to use as much of the heat as possible, and that meant a high stack.

MR. SHIRES added that ultimately the question was one of economics—balancing the expense involved in providing and operating larger blowers against the value of the extra heat recovered.

MR. GILES (Meehanite Industries) said that the 30-ft. high cupolas used in the USA were mechanically charged; consequently harder cokes were needed than those employed in Australia. It was not known whether in US practice the degree of breakage was greater. The cokes were more carefully graded than in Australia—4-in. and 5-in. sizes were common, and the usual stack height was 15 ft. If a better system of coke sizing was practised in Australia it would be advantageous to use higher stacks and mechanical charging with home-produced cokes, provided optimum conditions were maintained in the cupola.

MR. ANDREWS (General Motors-Holden) said that his company had purchased a trial shipment of 500 tons of Densite coke from Germany, and had found that the claims made for it were justified. With a cupola of 51-in. internal dia., Densite coke (9 per cent. of the charge) gave a temperature

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American Letter

S.-g. Iron Society completes its Organization

The Ductile Iron Society completed its organization at a recent meeting in Chicago of member company representatives, at which officers and directors were elected—Robert S. Thompson (president, H. P. Deuscher Company, Hamilton, Ohio) was chosen as the Society's first president. In his address, Mr. Thompson said that the purpose of the Society will be to represent its members in all matters of common interest in the fields of metallurgical research, product development and promotion, technical advice, and operational improvement.

Officers.

Other officers elected are: vice-president, William Beatty (vice-president, Morris Bean & Company, Yellow Springs, Ohio); secretary-treasurer, R. K. Guise (metallurgist, Kuhns Brothers, Company, Dayton, Ohio); and executive-secretary, James H. Lansing (castings consultant, Cleveland).

Directors.

The directors chosen are: Midwest Section—W. H. Shinn (Gunite Foundries Corporation, Rockford, Ill.) and W. B. Aylward (Neenah Foundry Company, Neenah, Wis); Eastern Section—Arthur Avedisian (Taylor & Fenn Company, Windsor, Conn.) and Armande Giorgio (Ductile Iron Foundry Incorporated, Stratford, Conn.); Southern Section—Niel Mingeldorf (Savannah Machine & Foundry Company, Savannah, Ga.); Southwest Section—E. C. Graham (Acme Foundry & Machine Company, Blackwell, Okla.), and West Coast Section—J. R. Ludwig (Soundcast Company, Newport Beach, Calif.).

Cast-iron Core-boxes for Shell Cores*

Shell core-boxes may be made of iron, steel, bronze, aluminium and other metals. Satisfactory results have been obtained from grey-iron core-boxes made by the author's company, using a "cast-to-size" process in dry sand with zircon facing. Pencil gates on ½-in. centres are incorporated, and the metal is poured at 1,315 deg. C. Boxes are given a normalizing treatment for 7 to 8 hr. at 510 to 595 deg. C., one to three times depending on size, to avoid distortion during machining. Grey iron is used for all shell core-boxes and shell-mould patterns, both being made by the "cast-to-size" method. The chemical composition of the grey iron used is as follows:

Carbon	320-340	6- to 9-mm. chill depth on a wedge-type specimen 1⅜ in. high by ⅜ in. base.
Silicon	220-240	
Sulphur	0.15	
Phosphorus ...	0.20	
Manganese ...	0.65	

Cast-aluminium Boxes

Cast-aluminium shell core-boxes have been used with varying results. The main objection to aluminium was that the coefficient of expansion up to 315 deg. C. differed from that of grey iron at the same temperature. If the rate of heat transfer in aluminium core-boxes was twice as rapid as that in grey-iron core-boxes, then the dissipation rate should follow the same line.

Experience has shown, however, that when using aluminium core-boxes on several shell-core machines, the machines can be operated on shorter cycles than when using grey-iron boxes, and at higher temperatures. On multiple-station machines (where six different sizes and shapes of cores were being made at the same time and temperature) some cores, because of their design, were good, whereas others having several right-angle sections were subject to insufficient cure, and peel-back occured. Warpage was encountered in the aluminium shell core-boxes after 30 days.

Cast-iron Boxes now used Exclusively

The author's company now uses cast-iron boxes exclusively. About 50 per cent. of the company's cores are now shell, made on 4 six-station, 1 two-station, and 1 one-station, units. Proper rigging of core-boxes to provide efficiency in blowing, curing and ejection of cores is of the utmost importance, regardless of whether the production rate is high or low. Cores can sometimes be made with from ½-deg. to no draft. Instead of screened vents, holes (usually about ⅜-in. dia.) are drilled, and square pegs are inserted. At parting sections, slots are milled to ½-in. out of the cavity, and a hole is drilled at that point. To date, the author's company has approximately 300 grey-iron core-boxes, producing shell cores, that have been in use over the past four years. These core-boxes have been subjected to temperature variations of from ambient up to 315 deg. C. Some are in production for 2 or 3 hr., while others have been used for 24 hr. a day for six days without cooling.

Precision-cast Dies

A casting method, utilizing a mouldable graphite mixture, to produce dies with cavities cast to final dimensions has been successfully developed, the manufacturing methods division of Air Materiel Command have announced. The work was performed under contract by the Armour Research Laboratories of the Illinois Institute of Technology. By this casting process, alloys which are difficult to machine are used to make finished dies for hot-forging operations, without costly and time-consuming machining of the forging dies. High die-operating temperatures have been proved advantageous for intricate shapes, in that the forged part is not chilled as severely as in normal practice.

The final report reveals that the cast dies have been used for forging steel at an operating temperature of 870 deg. C. The casting method of producing dies was sought because, in normal forging practice, it is often difficult or impossible to produce forgings with long, thin projections that extend deep into the die cavity. These sections are difficult to form because, as the hot forged metal is forced into them, it is rapidly chilled by the cold die. D. C. Harleman, project engineer, said that where forgings with long, thin projections are required, they are usually produced with thicker rib sections than necessary for the finished product, and then machined to final size. This production method was, of course, very expensive.

Automation Congress

The Fifth International Automation Exposition and Congress will be held in New York City, at 500 Eighth Avenue, from November 16 to 20. Advance enrolment is necessary, as the number of persons who can be accepted is limited. Amongst the technical sessions planned are: "automatic control of machines"; "human factors in systems engineering"; "plant layout for automation"; and "office automation." Automation "clinics" will be held, consisting of 90-min. lectures and demonstrations based on exhibited equipment.

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* Synopsis of a paper presented at the AFS Congress in Chicago, in April. The author is J. E. Stock (superintendent *of foundry* methods and processes at the John Deere Waterloo *Tractor Works, Waterloo, Iowa).*

Equipment & Supplies

Lead Bricks for Radiation Shields

A new lead brick for use in shielding personnel against Gamma, Beta and Alpha rays has been produced by a special "pressure moulding" technique by British Lead Mills, Limited, Byron House, 7/9, St. James's Street, London, S.W.1., a member of the Firth Cleveland Group. The company was approached by the United Kingdom Atomic Energy Authority, Harwell, some time ago and after a period of close liaison with Harwell a standard pressure-moulded lead brick was produced by the company at Welwyn Garden City. With lead bricks produced by pressure moulding, it is claimed that the greatest density and freedom from porosity and inclusions is ensured. The bricks are 2, and 4 in. thick, in the form of standard, corner, top and bottom bricks and also half or even quarter bricks which can be built up into a complete surround by virtue of their interlocking nature, to give the maximum thickness at any point of 2 in. or 4 in. or multiples thereof.

Metallic-lead Primer

Allweather Paints, Limited, 36, Great Queen Street, London, W.C.2, are now marketing the new Pitan metallic-lead primer, which, when applied to iron and steelwork, forms a blanket of metallic lead and seals the surface from electrochemical activity (the main cause of corrosion). The metallic lead, plus the oil in the film, also forms lead soaps, which combine to give excellent adhesion and restrict the spread of any corrosion already present on the surface being treated. The primer should be overcoated within a few weeks with one undercoat and one finisher, hard-gloss paint or enamel. Interesting features of the primer are: Drying time, six to eight hr.; film thickness of 0.001 in.; no settlement when stored, and a covering capacity of approximately 45 sq. ft. per lb.

Hard-surfacing of Impeller Blades

Metal Deposits, Limited, of 772/4, Chester Road, Stretford, Lancs., have recently been carrying out the deposition of high-grade wear-resisting alloys on impeller-rammer blades for the purposes of increasing the life expectancy of these items. The application proved completely successful and increased the life of a blade from 2 days to 4/6 weeks before a replacement was required. A notable point is that after the blades are taken out they can again be processed and put back into operation once more.

Miniature Fork-lift Truck

G. Hunter (London), Limited, 80, Fenchurch Street, London, E.C.3, announce the introduction of the Steinbock Piccolift fork-lift truck, claimed to have advantages of a sit-on rider-controlled truck and yet a length of only 37 in. Its capacity is 10 cwt. at 24 in., or 11 cwt. at 20 in., load centres. The truck is three wheeled, with an independent motor on each front wheel. Towing capacity is available up to 10 tons, and from 60 up to 138 in. height of lift can be supplied. Drive is by electric traction batteries, and cushion tyres are fitted as standard.

Mobile Casting-bogie

Mellor Mineral Mills, Limited, Etruria Vale, Stoke-on-Trent, are now marketing the Dohm-Davison mobile casting-bogie (Fig. 1). The bogie is claimed to reduce operator fatigue and labour costs, and to be quicker and safer than casting by hand-shank. It has a capacity of approximately 112 lb. of metal, and is adjustable for casting moulds up to 24 in. in height. The holding-band may be adjusted for varying sizes of crucible or ladle by means of cleats. The overall length of the bogie is 6 ft., and the wheels are 12 in. apart. The ladle is 14 in. deep, and set at its lowest point is 9 in. from the floor.

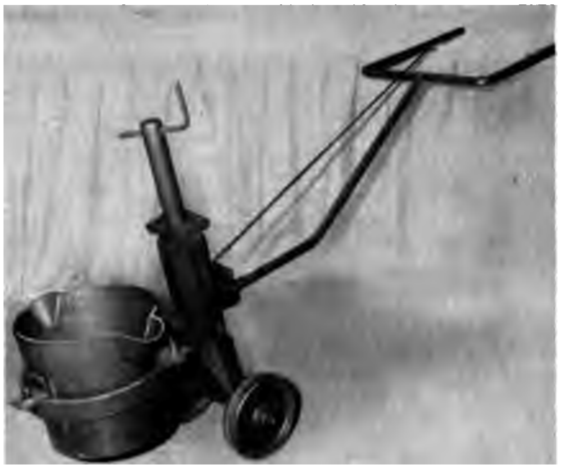


FIG. 1.—*Mobile casting bogie introduced by Mellor Mineral Mills, of Stoke-on-Trent.*

ALFRED BULLOWS & SONS, LIMITED, Long Street, Walsall, announce a new quick-release fluid-hose coupling, manufactured under licence from the Binks Manufacturing Company of America. This new coupling is compact and hard-wearing, and its push-and-turn operation is claimed to be quick and foolproof. The principal advantages offered by the coupling are (*a*) it enables the operator to make a rapid change of colours, and (*b*) the gun may be disconnected for cleaning without the necessity of "blowing back" or cleaning out fluid lines.

IN ORDER TO meet the growing demand for specialized compounds in the epoxy-resin field, Shell Chemical Company, Limited, announce that they have made arrangements whereby their proprietary compositions of this type will be made available to industry from Beck, Koller & Company (England), Limited, of Speke, Liverpool, and C. V. A. Jigs, Moulds and Tools, Limited, of Hove, Sussex. In addition, arrangements have been made for W. Pickard & Company, Limited, of Sheffield, to supply proprietary compounds based on Epikote resins to the foundry industry.

EFCO, LIMITED, Netherby, Queens Road, Weybridge, have introduced a new vertical, cylindrical closed-quench furnace for gas-carburizing and carbo-nitriding applications, involving controlled atmospheres. Electrically heated by Corrtherm elements or gas-fired with radiant tubes, it is claimed that—stemming from the choice of a cylindrical vertical shape—fuel economy of the order of 15 per cent. is possible compared with conventional horizontal rectangular furnaces.

SIMMONDS AEROCESSORIES, LIMITED, Pontypridd, Glam, have decided to extend indefinitely the scheme under which purchasers of Surform tools may return them to the manufacturers within seven days of purchase if they are not satisfied with their performance, in which case, purchase price will be refunded.

Electricity in Industry

Industrial applications of electricity for heating, space heating, and lighting were dealt with by speakers during a course for engineers of the National Industrial Fuel Efficiency Service which was held recently at the Central Electricity Generating Board School, Buxton (Derbyshire).

Speaking on "Industrial Lighting," Mr. W. Robinson, B.SC., lighting officer of the Electrical Development Association, said, "It would be misleading to suggest that increased lamp efficiency means a reduction in the use of fuel for lighting. As, through better lamps, industry goes on receiving more electric light for money spent, so lighting standards will improve and artificial lighting will extend over the working day. The real fuel saving for electric lighting will come as a result of more efficient industrial structures."

Continuing, Mr. Robinson said "However adequate might be the illumination in a factory its usefulness could be partly or completely destroyed by glare and by faulty layout of equipment. There was only one complete safeguard against glare, and that was the complete concealment of lamps at normal angles of view. Present Factory Act regulations called for a 20 degree angle of light cut-off below the horizontal, but the modern tendency was to increase this angle to 30 degrees and even more. Even so, it had to be remembered that, although reflectors might prevent direct view of lamps, the bright interiors of the reflectors could still be seen even at low angles and the most recent approach was to use aluminium reflectors so shaped that the lower part of the reflector did not appear bright to the normal observer. It was important to realize that lighting discomfort increased in direct proportion to the number of lighting fittings which could be seen at one time. For any given height of fitting, the larger the lighted area, or the higher the illumination, the greater was the number of fittings visible, and hence the greater the possibility of glare discomfort." The speaker concluded by saying in two factories the lighting and heating systems were so integrated that the heat from the lighting installation was supplying the full or major part of the space-heating requirements of large areas. There were counterbalancing problems of summer cooling, but one had to recognize that naturing lighting *via* glazing introduced the same problem without compensating winter fuel saving.

A Reminder!

Members of the Institute of British Foundrymen who intend to participate in the National Works Visits function on Friday, October 30, are reminded that the closing date for receipt of appplications is September 30. National Works Visits Day is the occasion when parties will assemble in London for a series of visits to foundries in London and the Home Counties, eight establishments having issued invitations and offered hospitality. On the same evening, the parties will re-assemble in the West End for dinner and light entertainment. Application forms are available from the secretary of the Institute, Mr. G. Lambert, at St. John Street Chambers, Deansgate, Manchester, 3; details of the arrangements were published in this JOURNAL, September 3, page 100.

INC Address Changed:

The Ironfounders' National Confederation has changed its address to 12th Floor, City Centre House, 30, Union Street, Birmingham 2 (phone: MIDland 8427).

Firth Cleveland in USA

A new company to represent the Firth Cleveland Group in the United States has been formed in New York. Known as Firth Cleveland Incorporated, the company has offices at Lincoln Building, 60 East 42nd Street, New York. The director and vice-president is Mr. J. A. Hayward, (the son of Mr. C. W. Hayward, chairman and managing director of Firth Cleveland, Limited) and the treasurer and secretary is Mr. G. R. Bentley.

A second new company Surform Incorporated, which has been formed as a subsidiary of Firth Cleveland Incorporated, will be responsible in the USA for distribution of Surform and Surcut hand tools. Before the present re-organization, the only Firth Cleveland companies in the USA were Stenor Incorporated and Simmonds Stop Nut Corporation of New Jersey. These have now been taken over by Firth Cleveland Incorporated.

An important division of the newly-formed company will be the Firth Cleveland Steels Division, under the management of Mr. P. H. Garfunkel. This division will be responsible for the distribution in the USA of the products made in England by Firth Cleveland Steel Strip Limited, the Firth Company, Limited, Richard Hill, Limited, and Keeton Sons & Company, Limited.

Output at Sterne's

L. Sterne & Company, Limited, makers of refrigeration machinery, Hillington, Glasgow, who are the British licensees for the production and distribution of Tecumseh compressors, are making more than 2,000 of these units for refrigeration plant every day. Within the next few months, when about 60,000 sq. ft. of factory space has been added to present capacity, output is expected to be run at the daily rate of 6,000 compressors from the company's hermetic unit division.

Between 60 and 70 per cent. of the output is exported, the chief market being Canada, where 100,000 units are expected to be sold next year. The development of slot-machine self-service of fresh foods has provided a growing market for the company's Tecumseh product. Mr. Carruthers, a managing director of the firm, has also confirmed that the firm's compressors will be installed in the slot-machine service which will be operated under the recently announced arrangement between the Hawker Siddeley Group and J. Lyons & Company, Limited.

Latest Foundry Statistics

Light-alloy Castings: Belatedly, the Ministry of Supply have reported that in May the production of magnesium castings was 150 tons, a slight improvement on this year's monthly average. During this month, 7,266 tons of aluminium castings were produced, of which 1,602 tons were made from sand moulds; 3,914 tons as gravity-die and 1,750 as pressure-die-castings, again a practical gain on the average for the first five months of the year.

Building Exhibition, 1959

The Building Exhibition is to be held at Olympia, London, from November 18 to December 2, when an area of 460,000 sq ft. will be occupied by a most comprehensive display of developments in the building industry. Many countries from overseas will be participating, those exhibiting for the first time being Finland, Spain and Portugal.

Scotland retains Order for Baths

Following a protest from a Falkirk union, Kirkcaldy (Fife) Housing Committee have decided an order for baths for houses in the Dysart redevelopment scheme should be placed in Scotland rather than England. The protest came from Bailie William Ure, Falkirk, divisional organizer of the Amalgamated Union of Foundry Workers, in a letter to the housing convener, Councillor David Blyth.

The baths were ordered in July from M. Cockburn & Company, Falkirk, the order was then switched to a Hull firm. According to Bailie Ure the order was cancelled on the instruction of the town Council's architects, who apparently insisted that the baths should be obtained from Ideal Boilers Limited, Hull. Bailie Ure also said in his letter that the Falkirk firm was regarded as one of the foremost bath manufacturers in the country, and had supplied baths to the British and other Royal families. The order would provide employment for five moulders and an enameller for a week, and contribute to the employment of other workers. The baths ordered were standard, and there was no reason to suppose any advantage in either price or quality would accrue from the transfer.

Councillor Blyth said later that he felt that orders by Scottish authorities should, where possible, be placed with Scottish firms. The question of the order for the baths being transferred to an English firm had subsequently been discussed by the committee, and they had decided unanimously the baths should be supplied by the Scottish firm.

Maria Cristina Chemical Industries Inc. of Manila, Philippines, has started to produce ferro-silicon, ferro-manganese, and silicon-manganese, states an economic report from the Board of Trade.

General Electric Share Issue

Preference, ordinary, and unsecured loan stockholders in the General Electric Company, Limited, submitted more than 7,500 applications totalling over £43,000,000 stock for the £4,000,000 of the new 6 per cent. unsecured loan stock 1979-84 available to them. The issue was for £8,000,000, but holders of the maturing 3½ per cent. unsecured loan stock 1954-59, in accordance with their agreement, applied for £4,000,000 of the new stock. Such applications have been accepted in full.

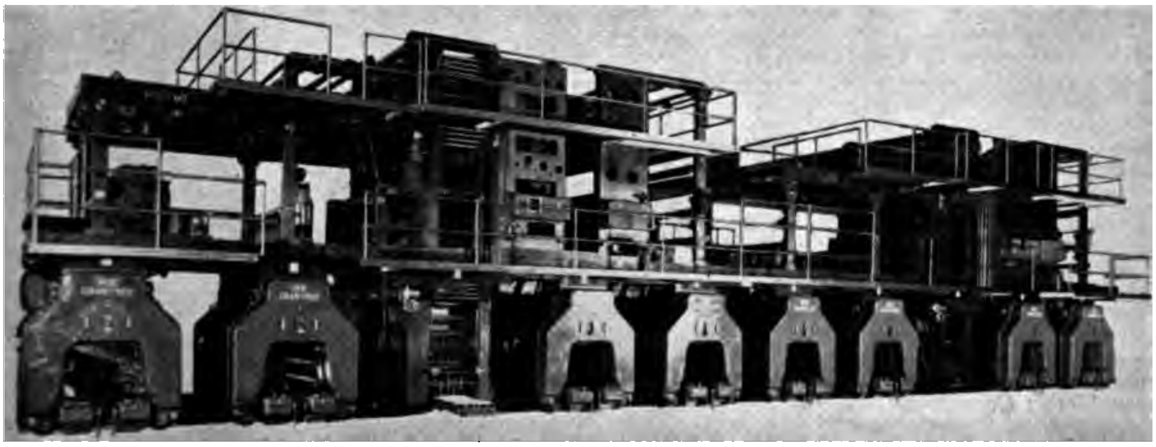
In the allotment of the £4,000,000 stock not subject to that engagement, applications for £100 and £200 stock have been allotted in full. Those applying for £300 to £50,000 stock have been allotted approximately 10 per cent. of their applications with a minimum of £200 stock; over £50,000, the allotment is approximately 5 per cent. with a minimum of £5,000. In a limited number of cases, allotments have been reduced to take into account the size of the applicants' holdings in the company.

At the company's annual meeting in London on Thursday, September 3, the chairman, Sir Leslie Gamage, said there was a definite improvement in the figures for the first two months of the current year. They knew from experience, however, that the first few months of the year were not necessarily an indication of those to follow.

Goodyear Tyre & Rubber Company (Gt. Britain), Limited—Mr. W. R. Booth, appointed financial director and secretary, succeeds Mr. A. H. Brundage, who has returned to the headquarters of the Goodyear Company, in Akron, Ohio, to take up another assignment. Mr. Booth was previously managing director of Goodyear-Cuba.

Newspaper Presses for New Zealand

An order for two newspaper presses for the publishers of the New Zealand Herald *will be completed shortly by R. Hoe & Crabtree, Limited, of London, S.E.1, when the second of the "Supercolour" rotary presses is installed. Each press consists of eight units with two single-double former folders, three arm-magazine roll-stands with flying pasters, and two rack-back multi-colour units. The publishers who ordered the presses are Wilson & Horton, Limited, who have built a new building in Auckland to house the presses. Each of the press units and folders is shipped in a completely assembled state. A special lifting beam, which is bolted across the top of each unit and has a single lifting eye for attachment to the crane hook, has been constructed. Each unit (weight 15 tons) is lifted on to a cast-iron base plate, bolted down, and then the whole lifted into a packing case. The total weight of each packed unit is 16 tons.*



Personal

Mr. J. E. Robson, a local director of Samuel Osborn & Company, Limited, has been appointed a director.

Dr. Alan Lloyd Davies has been appointed to a Lectureship in Metallurgy at the College of Advanced Technology in Birmingham.

The Earl of Halsbury has been appointed scientific consultant to the research department of Davy & United Engineering Company, Limited, Sheffield.

Mr. B. M. Hardman, a partner in Trent Laboratories, metallurgical consultants, Stoke-on-Trent, has been elected a fellow of the Institution of Metallurgists.

Mr. H. M. Taylor, a director of R. W. Crabtree and Sons, Limited, has been invited to address the Metal Decorators' Convention in New Orleans, to be held from October 12 to 14.

Mr. Charles H. T. Williams, managing director of the Park Gate Iron & Steel Company, Limited, Rotherham, has been elected senior warden of the Cutlers' Company in Sheffield.

Mr. H. C. Horsup, secretary of Ransomes & Rapier, Limited, having reached retiring age, will retire after nearly 40 years' service on September 30. He will be succeeded by Mr. G. N. Rodgers.

Mr. F. S. Woodward has been appointed secretary of the Consett Iron Company, Limited, and will take up the appointment on December 1. He is at present secretary of Round Oak Steel Works.

Mr. Iain Macleod, Minister of Labour and National Service, has appointed Mr. H. W. Evans to be his Principal Private Secretary, in succession to Mr. D. R. F. Turner, who is transferring to the Cabinet Office.

Mr. L. P. Lee has been appointed to succeed Mr. A. V. Wilkin as chairman of the British Internal Combustion Engine Manufacturers' Association for the coming year. Mr. H. Desmond Carter becomes vice-chairman.

Mr. R. Yeoman, general manager of the Hodgkinson group of foundries has been elected a director of the parent company, James Hodgkinson (Salford), Limited, mechanical-stoker manufacturers, Ford Lane Works, Pendleton, Manchester.

Dr. W. D. Scott has been appointed managing director of BTR Industries, Limited, from October 1. He will succeed Mr. P. W. Howard, who is relinquishing that position but will remain a director and deputy chairman of the company.

Mr. William Sutton who had been works manager for 20 years at Wellman Smith Owen Engineering Corporation, Limited, Willenhall, received presentations from the directors, staff and workpeople on his retirement after 32 years' service with the company.

Sheepbridge Equipment, Limited (foundry division), and Sheepbridge Alloy Castings, Limited—two subsidiary companies of the Sheepbridge Engineering group—announce the appointment of Mr. J. E. Pearson of "Whitecroft," Whinney Lane, Langho, near Blackburn, as an additional Lancashire area sales representative.

The European Coal and Steel Community announce that the new president of the High Authority is Mr. Piero Malvestiti, hitherto vice-president of the Common Market Commission, and the two vice-presidents are Mr. Dirk Spierenburg and Mr. Albert Coppe, who held the same appointments in the previous High Authority. The new appointments are for two years.

After 27 years service with Aga Heat, Limited, Mr. P. R. Lunn has resigned and taken a position with OTMA, management training consultants, Little Russell Street, London, W.C.1. During his period with Aga Heat, no fewer than 700 representatives attached to the firms agencies attended his lectures. Mr. Lunn was the recipient of parting gifts at a reception recently held at Orchard House, London.

Mr. W. J. Straker-Smith, Mr. James M. Jardine and Mr. C. E. Hunter have been appointed to the board of Smith's Dock Company, Limited, as from October 1. Mr. Jardine is secretary of the company, and Mr. Hunter, manager of the company's South Bank shipyard. Sir Tristram Edwards is to retire from the board on September 30, after 57 years' service—45 as a director. He will remain honorary president.

Mond Nickel Company, Limited, announce that the development branch of the company's Development and Research Department has recently been reorganized into four divisions under the general managership of Mr. F. Dickinson, a director of the company. The divisions are as follow:—Ferrous division (manager, Mr. W. W. Braidwood); non-ferrous division (manager, Mr. J. Hinde): applicational engineering division (manager, Dr. A. B. Everest), and general division (including plating, chemical products and nuclear power) (manager, Dr. E. C. Rhodes). Mr. L. W. Johnson, at present assistant manager of the Department, having reached retirement age, will relinquish his appointment at the end of September.

Obituary

Mr. Paul Suurkivi, senior design engineer in the research division of the Brush Electrical Engineering Company, Limited, Loughborough (Leics), has died at the age of 44.

The death has occurred of Mr. Ellis Shackleton, who for the past nine years had been sales manager of Dean, Smith & Grace, Limited, lathe and tool manufacturers, Keighley. He was 58 years of age.

The death took place on Thursday, September 3, of Mr. Tom Hopes, senior assistant engineer manager at the Southampton repair department of John I. Thornycroft & Company, Limited. He was 57. Mr. Hopes joined the company in Singapore in 1935 and went to the repair department in 1942.

Mr. Roger Walcott Newberry, a former assistant manager of Ruston-Bucyrus, Limited, Lincoln, has died in North Carolina, USA. He was among those who came over from the States in 1929 to discuss the formation of the company. He resigned his Lincoln appointment in 1940 and returned to the parent company, the Bucyrus Erie Company, of South Milwaukee, United States, of which he became vice-president.

The death is announced, in the French Press, of Mr. Gastave Rivoire, a past-president of the *Association Technique de Fonderie*. He was on the staff of Delattre et Frouard, but was best known for his pioneer work on the development of light alloys. He was an ex-student of the Paris foundry college, being one of its early entrants. During the 1914 war he was awarded both the *Médaille Militaire* and the *Croix de Guerre*. For his work in the training of foundry personnel he was made a Chevalier of the Legion of Honour. He was 68 years' old.

News in Brief

This year, the Danish Foundry Employers Association has celebrated the 40th year of its incorporation.

The *Bureau International de la Récupération* (B.I.R.), announces that the annual congress will be held in Düsseldorf from October 27 to 29.

United Dominions Trust, Limited, announce the opening on September 21, of a new branch office at 7/9, Cowgate, Peterborough, Northamptonshire.

Northampton depot of British Insulated Callender's Cables, Limited, from September 28 will be at 18/22, St. George's Street. The telephone number (Northampton 1860) is unchanged.

Aviation Electric, Limited, Montreal, PQ, has been appointed exclusive distributors for the Dominion of Canada of the engine-protection equipment of Teddington Industrial Equipment, Limited, Sunbury-on-Thames (Middx).

Ultrasonoscope Company (London), Limited, Sudbourne Road, Brixton Hill, London, S.W.2, have recently delivered to India the first automatic test rig for the ultrasonic inspection of turbine discs. It is said to be the first unit of its kind to be supplied to that country.

The Institute of Welding announces that Professor N. N. Rykalin, Dr. techn. sci., corresponding member of the USSA Academy of Sciences, will lecture at the School of Welding Technology on September 29 and 30, and at the special meeting on "Electro-Slag Welding" on October 1.

Stanton Ironworks Company, Limited, near Nottingham, has received an order, valued at approximately £250,000, from the East Midlands Division of the National Coal Board, to supply cast-iron tubbing-rings for the lining of two shafts at the new Cotgrave Colliery, Nottinghamshire.

Thos. W. Ward, Limited, Sheffield, have despatched the first consignment, weighing 40 tons, of parts for four dockside cranes for Casablanca. Each crane weighs 80 tons. It is dismantled and needs seven lorries to transport it. The total load of 320 tons is being moved in 28 loads.

Borough Polytechnic, Borough Road, London, S.E.1. announce a special lecture course on "Refractories, their Manufacture Properties and Uses." There are to be ten weekly lectures beginning on Friday October 9, at 7 p.m. Details are available from the secretary, Mr. Fredk. J. Packer.

Mr. W. E. A. Redfearn, managing director of English Steel Corporation Limited, Sheffield, gained five awards at the 15th annual garden-produce show of the firm's sports club at their pavilion in Bellhouse Road, Sheffield. Mr. W. Searston, a works manager, won the Directors' Trophy for most points. There were 200 exhibits.

The British Coal Utilisation Research Association announce that the eighth Coal Science Lecture—"Coal: a Colloid and a Chemical"—will be delivered by Sir Eric Rideal, F.R.S., in the Lecture Theatre, Institute of Civil Engineers, Great George Street, London, S.W.1, on October 14, at 5.30 p.m. Admission will be by ticket only.

A special course for social and sports clubs secretaries in industry is being held at Lilleshall Hall, Shropshire, from October 5 to 9. It is being sponsored jointly by the Central Council of Physical Recreation and the Industrial Welfare Society, and the programme will consist of lectures and discussions on the role of the industrial club and the sports officer's job.

Following the reduction of British Railways' requirements of wagons and the decision of Hurst, Nelson & Company, Limited, Motherwell, to cease production, the company's plant has been acquired by George Cohen, Sons & Company, Limited, a member of the George Cohen 600 Group, Limited. Various individual items will be offered for re-use in industry.

A further order for the latest Leyland buses with fully-automatic gearchange has been placed by the Department of Government Transport, New South Wales. The new contract covers 50 Leyland Royal Tiger Worldmaster single-deck buses similar to the 156 ordered by the Department last year, making a total of some £1,300,000 invested with Leyland Motors, Limited in this type of bus.

The Institution of Plant Engineers announces that the next of their comprehensive refresher courses for senior works and plant engineers, comprising 18 weekly lectures on Thursday evenings, will commence on October 29, at Leeds University. The fee for the course is four guineas, and full particulars may be obtained from the secretary to the refresher course, Department of Engineering, The University, Leeds, 2.

Regrouping of its central-heating interests within a single company—Bratt Colbran, Limited—is announced by Radiation, Limited. Bratt Colbran is now responsible for Ductair warm air central-heating equipment and Ascot central-heating boilers, as well as other methods of central heating now being developed. Mr. Frank Davies has been appointed general home sales manager and Mr. C. A. F. Bennett, sales manager, central heating.

The Forfeit Feast of the Cutlers' Company is to be held at the Cutlers' Hall, Sheffield, on September 25, and amongst the guests will be the Duke of Devonshire; the Master of the Worshipful Company of Cutlers in London, Mr. G. V. Thomson; the Master of the Worshipful Company of Armourers and Brasiers, Mr. W. Pontifex; the Lord Mayor of Sheffield, Alderman A. V. Wolstenholme; and the Bishop of Sheffield, Dr. Leslie Hunter.

A proposal to take control of one of the largest French manufacturers of motor accessories—Auto-Coussin Dura—is being considered by Wilmot Breeden, Limited, Birmingham manufacturers of similar products. Auto-Coussin Dura, a private company which had a turnover of £8,500,000 last year, claims to control half of the French market for car door accessories and panel windows, 20 per cent. of the market for car seats, and 10 per cent. for spring mattresses. The company has no subsidiaries elsewhere in France or abroad.

Six men working on a cupola furnace at the works of the Brightside Foundry & Engineering Company, Limited, Sheffield, last week, were affected by carbon-dioxide fumes. All but one of the men—who were trying to release a blocked pipe—managed to climb down in time. Mr. John Beever (64), who is in charge of the steelworks' medical room, climbed 87 ft. to a narrow ledge to the unconscious chargehand, Mr. Harry Wilson. After giving artificial respiration for 20 minutes on a ledge only 18-in. wide, Mr. Beever managed to save Mr. Wilson.

Four-day exhibitions illustrating the properties and uses of nickel and its alloys are to be staged by Henry

British Blast Furnaces in the June Quarter, 1959

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the second quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hema-tite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Ford Motor	1	—	—	—	1	1	1
Holwell Iron	—	—	2	—	2	2	4
Kettering Iron & Coal	—	—	—	—	—	—	2
Renishaw Iron	—	1	1	—	2	2	2
Sheepbridge	—	1	1	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	1	2	—	3	4	5
Staveley Iron & Chemical	—	—	3	—	3	3	4
Stewarts and Lloyds: Corby	—	3	—	—	3	3.8	4
Wellingboro' Iron	—	1	—	—	1	1	3
TOTAL	1	7	9	—	17	18.8	27

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	1	—	—	1	1	1
Darwen & Mostyn Iron	—	—	—	1	1	1	2
Lancashire Steel Manufacturing	—	2	—	1	3	3	3
Summers, John	—	2	—	—	2	2	2
TOTAL	—	5	—	2	7	7	8

North-West Coast.

Barrow Ironworks	1	—	—	—	1	1	4
Charcoal Iron	—	—	1	—	1	1	1
Millom Hematite Ore & Iron	2	—	—	—	2	2	2
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	5	—	1	1	7	7	10

Lincolnshire.

Appleby-Frodingham Steel	—	3	—	—	3	3	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	3
TOTAL	—	8	—	—	8	8	10

North-East Coast.

Consett Iron	—	2	—	—	2	2	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	—	—	—	—	—	2
Bessemer	—	—	—	1	1	1	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	3
Normanby Iron Works	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron:							
West Hartlepool	—	2	—	—	2	2	2
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	4	12	—	1	17	17	28

Scotland.

Bairds & Scottish Steel: Gartsherrie	—	2	—	—	2	2.8	3
Carron	—	—	1	—	1	1	4
Colvilles: Clyde Iron Works	—	1	—	—	1	1	3
Ravenscraig	—	1	—	—	1	1	1
Dixon's Ironworks	—	—	—	—	—	—	6
TOTAL	—	4	1	—	5	5.8	17

South Wales and Monmouthshire.

Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	3	3
Steel Company of Wales: Margam	—	4	—	—	4	3.6	5
TOTAL	1	3	—	—	10	9.6	12

"Castings for USA"

The Board of Trade, under "Export Opportunities," record that they have been advised by the British Consulate at Portland, Oregon, that the Willamette Iron & Steel Company of Portland require information about United Kingdom firms able to produce iron, steel and stainless-steel castings. The American firm are anxious to make contact with United Kingdom firms who would be prepared to submit quotations for castings, or quantities of castings, against bids received by the USA firm in connection with tenders put out by such concerns as the Corps of Engineers, Bonnefield Power Administration and the Bureau of Reclamation, etc. It is understood that recent tenders have been issued for dam-lifting gates, sluices and material for hydro-electric projects.

United Kingdom firms interested in doing business with the American firm are asked to let Willamette know their experience in producing to US specifications, their production range in weight limits, approximate capacity and, preferably, should give the name of a specific individual. Correspondence should be addressed to Mr. K. J. Wittkop, purchasing department, Willamette Iron & Steel Company, 2800 N.W. Front Street, Portland, Oregon.

[The Willamette company started in 1918, and have for years maintained a position of prominence throughout the Pacific Coast. UK firms responding to this invitation should send copies of their initial correspondence to the British Consulate, 907 Lewis Building, Portland 4, Oregon.]

RA ctures

British Cast earch Associa- ntly with the gy Department yal College of and Tech- Glasgow, has l a series of to be given in at the Royal luring October ember. This of lectures, ie title "Cast an Engineering " is intended for the engi- l designer: it instruct or re- them on the gy and proper- ie material and te correct prin- f design from ct of both the nan and the the casting. ectures will be each succes- rsday afternoon ctober 22 to r 3. With one , the lectures undertaken by staff. Enrol- ms can be ob- om the secre- Royal College of Science and Technology, , C.1, and the enrolment fee is £3 3s. 0d. for se of 14 lectures.

gress in Training Technologists

ountry is now moving very fast towards its te aim of doubling the output of scientists nologists by the late 1960s, said the Minister of n, Mr. Geoffrey Lloyd. He was speaking at ial opening on September 16 of extensions to College of Technology and Arts.

technical college buildings were now being it the rate of one a week, sandwich courses had l from about 70 in 1955 to more than 300 in ent session, and the intake of students to l courses had increased by more than 700 per ce 1956.

r in the day the Minister visited the Rugby of the British Thomson-Houston Company, to open its new education building. He was y Lord Chandos, chairman of the parent com- sociated Electrical Industries, Limited. Because as not enough time for Mr. Lloyd to meet es at work in the factory arrangements were r him to see them by means of a closed circuit.

has more than 2,000 apprentices, including 333 146 graduates, and 150 who are taking the course at the college.

British Blast Furnaces in the June Quarter, 1959—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of second quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall Iron & Steel	—	—	—	—	—	—	2
Shelton Iron & Steel	—	2	—	—	2	2	3
Stewarts and Lloyds: Bilston	—	1	—	—	1	1	2
TOTAL	—	3	1	—	4	4	9

Sheffield.

Name of firm.	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	11	50	12	4	77	79.2	123

Weekly Average Number of Furnaces in Blast during the June Quarter, 1959, and the Previous Four Quarters

District.	1958.			1959.	
	June.	Sept.	Dec.	March.	June.
Derby, Leics., Notts., Northants, and Essex	21	19.2	20	20	18.8
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6.4	7	6.9	6.9	7
Lincolnshire	9.6	9.1	9.5	8	8
North-East Coast	19.2	17.7	18	17.4	17
Scotland	8.9	7	6.7	6	5.8
Staffs., Shrops., Worcs., and Warwicks.	5	5	5	4.9	4
South Wales and Monmouth	10.9	10.9	10.4	9.5	9.6
Sheffield	2	2	2	2	2
North-West Coast	7.8	5.7	6	7.4	7
TOTAL	90.8	83.6	84.5	82.1	79.2

The following companies have furnaces in course of construction or rebuilding:—Lancashire Steel Manufacturing; Millom Hematite Ore & Iron; South Durham Steel & Iron (West Hartlepool); J. Lysaght's Scunthorpe Works; Bairds & Scottish Steel.

EEC Equipment for Rolling Mills

Engineered and mainly manufactured at the Stafford Works of the English Electric Company, Limited, equipment worth over £1,000,000 has recently gone into service in four new rolling mills in the Midlands. Two are at Patent Shaft Steel Works, Limited, Wednesbury (Staffs), and the other two are at the Bilston (Staffs) works of Stewarts and Lloyds, Limited. The major part of the electrical engineering in all four mills, which are of the hot-reversing type, was carried out by the metal industries division of English Electric.

At the Patent Shaft Steel Works, the 38-in. blooming and slabbing mill and the 54-in. by 32-in./98-in. four-high plate mills each have a 5,000-b.h.p. (r.m.s.) main drive motor, with a speed range of 45 to 90 r.p.m. and a cut-out torque of 240 metre-tons. Both drives are identical and are fed from identical Ilgner sets. The contract also covered all the Ward Leonard auxiliary motors, the motor generator sets, the control gear, and the ventilation and lubrication equipment for the mill.

For the 40-in. blooming and the 32-in. roughing mills at Stewarts and Lloyds, English Electric supplied two identical main drives—5,600-b.h.p. (r.m.s.) motors, with speed ranges of 50-120 r.p.m. and cut-out torques of 240 metre-tons. Ingots from the melting shop are rolled into blooms on the 40-in. mill and round bars or square billets are produced on the 32-in. mill.

ADA (HALIFAX), LIMITED—Mr. D. E. Aslen has been appointed to the board.

News in Brief

DAVY AND UNITED ENGINEERING, LIMITED, Sheffield, held an "open day" at their Darnall works on September [illegible], when each employee was permitted to bring three guests and there were over 3.000 acceptances.

THE LONDON AREA SALES OFFICE of Northern Aluminium Company, Limited has removed, from Bush House to new premises at 50, Eastbourne Terrace, London, W.2 (Telephone: PADdington [illegible]).

WATTS CHEMICALS, LIMITED, will shortly be moving to more modern offices, and as from September 21 all communications should be addressed to: Friendly House, 24, Chiswell Street, London, E.C.1 (telephone: MONarch 2642).

TWENTY-NINE SENIOR BOYS from 21 public schools attended, from September 7 to 12, the first of two short courses on iron and steel production, research and management, being held by the United Steel Companies Limited, Sheffield.

THE CANADIAN steel industry produced 451.277 tons of steel ingots in August, compared with 265.698 tons in August, 1958. Total for the first eight months of this year was 3,700.228 tons, against 2.952,581 tons in the corresponding period of last year.

ROLLS-ROYCE, LIMITED, Derby, have presented Sheffield City Libraries with a £50 microfilm reader in gratitude for "excellent services." Over the last three or four years, the libraries have been able to lend the firm British and American atomic-energy reports.

EFCO, LIMITED, are building another factory in the LCC industrial development area at Sheerwater, near Woking, in Surrey. The new factory, scheduled for completion early next year, will provide up-to-date facilities for the manufacture of special furnaces.

TWO 33,000-TON TANKERS are being built in Fairfield, Scotland, for the Cía. Shell de Venezuela. Total cost will be approximately £5.000.000. The first was due to be launched this month and the second is expected to be launched towards the middle of next year.

THE PRODUCTION OF SPRINGS at the old-established firm of W. Griffith & Sons, Limited, of Brightside Lane, Sheffield, is due to cease shortly as its railway-spring-making business and certain items of plant have been acquired by English Steel Spring Corporation, Limited.

THE GLASGOW FOUNDRY of Alley & MacLellan (Polmadie), Limited, manufacturers of air and gas compressors and vacuum pumps, etc., is to be run down and will be closed by the end of October. It is hoped to absorb a few of the 70 workers in the company's Jessie Street, Glasgow, works.

THE DATE for the first exhibition of the Atomic Energy Authority Display at Sheffield has now been settled for the week from November 6 to 14. Accommodation problems have been solved by the authorization of Sheffield Museums Committee for the use of two galleries of the City Museum.

LORD DUDLEY GORDON, chairman of Hadfields, Limited, distributed £200 in prizes to apprentices on September 18. Mr. William Carron, AEU national president, who presented the certificates, told the apprentices that "In this age of rapidly expanding technology craftsmen would be needed as never before."

RENFREWSHIRE VALUATION APPEAL COURT, sitting at *Paisley on* September 16, allowed industrial derating on the research station of Babcock & Wilcox, Limited, at High Street, Renfrew. The assessor intimated an appeal. He proposed an assessment of £4,090, but the Court decided that the firm should pay rates on a sum of about £2,000.

AT A DINNER given by Broom & Wade, High Wycombe, Bucks, to members of their Quarter Century Club, now numbering 102, no fewer than 50 [illegible] watches were presented. A special guest was [illegible] E. Isaksen of Oslo, who for more than 25 years [illegible] been with Ronneberg, Hansen & Company, the [illegible] Norwegian agents.

THE EDINBURGH FIRM of Bruce Peebles & Company, Limited, electrical engineers, are shortly to receive [illegible] order for transformers, valued at between [illegible] and £400.000, to be used in the power distribution system of Victoria, Australia. This will be the second big order of its kind from Australia to be undertaken by the firm in the past two years.

THE FORTH BANK LOCOMOTIVE WORKS, Newcastle-upon-Tyne, believed to be the oldest works of its kind in the world, are to be closed down when present contracts are completed. Robert Stephenson & Hawthorns, Limited, the proprietors, state that during the past three years, steam locomotive business at the works has fallen away completely.

ONE OF TWO new 4,900-gross-ton cargo ships which were to have been built by the Burntisland Shipbuilding Company, Limited, for the Prince Line (a member of the Furness, Withy, Limited, group), has been cancelled and the Prince Line is to withdraw its three remaining vessels in the US-Far Eastern trade from that service "owing to increasing operating costs and intensive competition."

THE US General Electric Company has received official permission to go ahead with the construction of four turbine generators for a dam project at Barkley, Kentucky, in spite of the bid of $4,500,000 (£1.600.000) by the English Electric Export & Trading Company, Limited, which was $68,000 less than the American tender. The reason given was that the British bid was "not up to specifications."

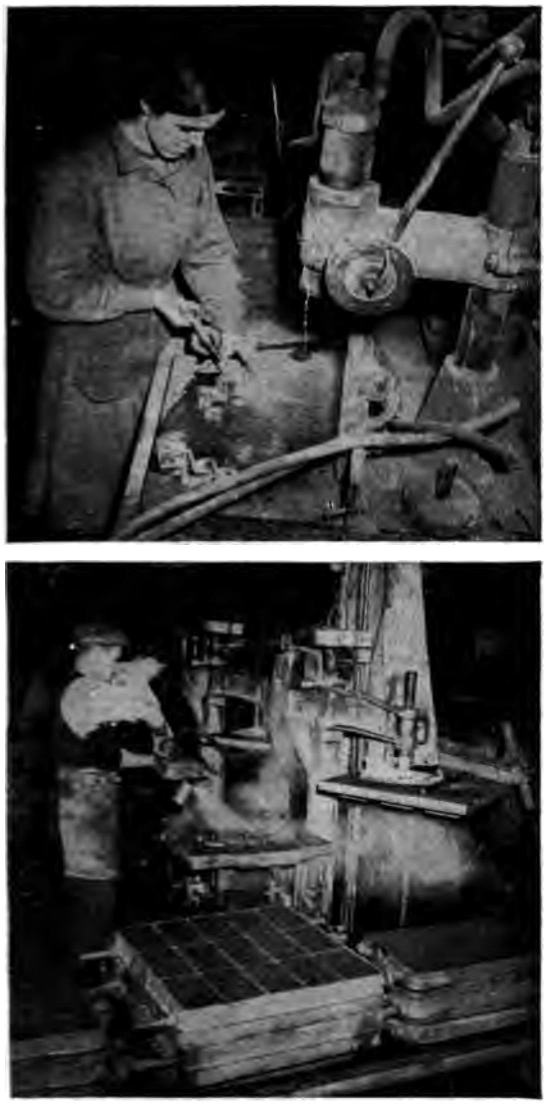
BOTH Colvilles, Limited, and Richard Thomas & Baldwins, Limited, have announced their intention to make steel, equivalent to open-hearth quality, by the new "L.D." mass-oxygen process, and it remains to be seen which of the two will be the first in Britain to produce quantity steel in this way. Colvilles, who were the first to make their intentions public, had development on these lines in mind when planning the Ravenscraig works five years ago.

HOME AND EXPORT sales departments of David Brown Construction Equipment, Limited, have been moved from Hanworth Park, Feltham (Middx), to the main David Brown tractor factory at Meltham Mills, near Huddersfield. The northern parts and service depot has been transferred from Mill Springs, Netherton, to the main David Brown parts and service factory at Scarr Bottom, near Huddersfield. The parts and service depot at Hanworth Park is being retained to serve customers in the south.

OVERSEA SERVICE announces a residential introductory course on "The Caribbean" (designed for men and women who are going out to Caribbean territories for the first time) to be held at Dunford, Midhurst, Sussex, from November 16 to 20. In order that the programme may be adapted to suit the needs of those attending the course, early applications would be appreciated, giving, if possible, the expected destination of the nominees. Applications should be made to the London office at 2, Eaton Gate, S.W.1.

(Continued on page 226)

REDUCE YOUR COSTS!



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Messrs. Henry Wallwork & Co., Ltd., Red Bank, Manchester.

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ONE spraying followed by AT LEAST ten trouble-free " lifts "—no hold-ups clearing sprayer nozzles — " PLP " IS SEDIMENT FREE! That is one reason why moulders speak so highly of " PLP " —pattern reproduction is so accurate—the and parts from the Plate cleanly—every time! Box after box—just like that! **In fact " PLP " is the logical LIQUID PARTING for all plate work and core box application.**

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News in Brief

(Continued from page 224)

Mr. Herbert Morley, general works manager, Samuel Fox & Company, Limited, Stocksbridge, Sheffield, told 600 retired employees at their reunion tea at Stocksbridge Victory Hall on September 19, that the firm's order books were full to "bursting." He also said that the firm was prepared to take its share of the large number of boys now leaving school, and the company would develop its training facilities. Mr. B. Butcher, director and head of the works social services executive, who sponsored the occasion, was chairman.

It is reported that property values in Southern Rhodesia's growing steel centre of Que Que have more than doubled since 1951, and figures show that in the last 14 years they have increased from under a quarter-of-a-million to nearly three-million pounds. After a lapse of eight years a complete re-valuation recently carried out shows there has been a total increase of £1,596,710, bringing the 1959 valuation roll up to £2,902,340. The increase in the value of improvements during these years is £1,341,505.

The Detail Design Buying and Accounts Departments of Acme Conveyor, Limited, have been transferred to 58/62, Seaward Street, Glasgow, S.1. The move has been made to bring about better and more centralized co-ordination with the works at Hillington Industrial Estates, Glasgow. The company's technical sales and projects departments will continue to be administered from Acme Chambers, 1, Bradford Street, Walsall, as will also Acme Ventilating, Limited. Additional sales offices are to be opened in due course in other areas.

By the terms of a recent agreement with Whessoe, Limited, Darlington, Norman J. Hurll & Company (Victoria) Pty., Limited, of Melbourne, Australia, and Christchurch, New Zealand, is able to offer the complete range of Whessoe gas plant in Australia and New Zealand, apart from W.W-D. electro-detarrers which Woodall-Duckham (Australasia) Pty., Limited, Melbourne, will continue to supply. The company will act as licencees, arrange Australian manufacture, and carry out contracts for plant to Whessoe designs and guarantees.

Yorkshire Industrial Fire Brigades Association held its conference at Scarborough on September 19, under the chairmanship of Mr. John R. Brewster, when delegates were welcomed by the deputy mayor, Councillor G. F. Hodgson. Papers were given by Mr. L. N. Duguid, deputy chief inspector of factories, on the new Factories Act; Mr. A. P. Backshelf on the origin, uses and hazards of industrial solvents; Mr. L. A. Ashton, department of Scientific and Industrial Research, on the Thermal Insulation (Industrial Implications) Act; and Mr. H. Powell, principal scientific officer, Home Office Forensic Laboratory, North Eastern area.

The North Thames Gas Board, serving over 1,000 sq. miles in and around London, has ordered 12 special multipurpose vehicles from Albion Motors, Limited, of Glasgow. The Board has already much operational experience with alternative tipper-platform bodies for each chassis, and now proposes to go one stage further by ordering chassis on to which any one of three alternative bodies can be mounted, *viz.*, platform, tipper or box. The platform and box bodies will be supplied by the Redhill Bodybuilding Industries, Limited, whilst the tipping bodies, together with Anthony hoist tipping gear, will be provided by the Steadman Engineering Company, Limited.

Obituary

Mr. **Samuel Arthur Woodward**, a former partner in Edward Barnett & Company, engineers and founders, of Walsall (Staffs), has died at the age of 85. The business is now carried on by one of his sons.

The death occurred on September 17 of Mr. **Thomas Walker Sykes**, commercial superintendent of David Brown Industries, Limited, Park Works, Huddersfield. Aged 62, he had been with the firm for over 45 years.

The death took place suddenly on Friday, September 18, of Mr. W. T. **Laverton**, a director of Robert Hyde & Son, Limited, of Stoke-on-Trent and Chesterfield. He was 67. Mr. Laverton who joined the company in 1930, retired from active work in 1953, but still retained his directorship of the company. In addition he was a director of Robert Hyde Investments, Limited.

The death is announced of Mr. E. L. N. **Van Loo**, who was manager of the industrial division of H. Englebert, N.V., Voorsschoten, distributors of NCK cranes and excavators in Holland. He was primarily responsible for the sale of the machines made at Thorncliffe, headquarters of Newton, Chambers & Company, Limited, which he had visited several times. When that company took over Ransomes & Rapier, Limited, last year, he represented the NCK Rapier Sales Company, Limited, which was formed subsequently. Mr. Van Loo was 50.

Recent Wills

Gross estate of Sir Frederick Pickworth, chairman of the English Steel Corporation, Limited, and of its principal subsidiary companies, amounted to £66,808. Net value of his estate was £64,576 and the duty amounted to £24,946.

Sir Frederick, who was 69, collapsed and died shortly after speaking at a dinner in Darlington on July 14 given in recognition of his chairmanship of Darlington Forge, Limited, an appointment he relinquished in 1957 when he became Master Cutler. He was also a director of Vickers, Limited, and of many other companies.

Kay, J. G., chairman of the Lafarge Aluminous Cement Company, Limited, London, W.1, and a director of other companies	**£29,734**
Browett, Sir Leonard, director of the National Union of Manufacturers, 1945-53, a director of Super Oil Seals & Gaskets, Limited, King's Norton, Birmingham	**£10.904**
Rushworth, C. D., a director of Rushworth & Company (Sowerby Bridge), Limited, machine-tool makers, of Sowerby Bridge (Yorks), Graham & Normanton, Limited, machine-tool makers, of Halifax, Darling & Sellers, Limited, machine-tool makers, of Keighley (Yorks), and A. Kinghorn & Company, Limited, machine-tool makers, of Todmorden (Lancs)	**£60.134**

Latest Foundry Statistics

Ironfounding: The Council of Ironfoundry Associations states that 122,689 ironfoundry workers were employed in the United Kingdom during the week ending August 1, of whom 8,327 were females. The July 4 total was 123,251 and for August, 1958, it was 131,061.

If you have a dust problem, we have an answer to it—an answer based on over 30 years' specialisation in industrial dust collection. During that time, we've settled pretty well every kind of industrial dust: metal, wood, plastic, food, chemical, and so on. We've done it with the help of up-to-the-minute scientific research and the widest range of equipment made in this country: filters, large and small unit collectors, wet collectors (particularly useful for fine or explosive dust), and complete plant installations. All our collectors are self-cleaning and are designed for either fully or semi-automatic operation.
See us for dust—and settle it once and for all.

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CRC 82

Raw Material Markets

Iron and Steel

Production of pig-iron is maintained at recent levels. Although in all grades capacity is not fully employed, outputs are more than sufficient to meet the present needs of all consumers. The average weekly rate of production is in the region of 220,000 to 230,000 tons and over the last 12 months there has been no appreciable variation from this figure. Expansion in overall consumption is slow for most grades of pig-iron. Many producers continue to find difficulty in disposing of their full outputs, while the fairly substantial stocks held by them show no material decline, apart from the stocks of high-phosphorus pig-iron; these have been reduced mainly by the export business received recently. The increased outputs at the steelworks have called for larger tonnages of basic pig-iron, but these have not been as large as expected due to the increased usage of scrap, which is also being utilized in larger quantities by many foundries in their mixtures at the expense of pig-iron. With the present state of the market and the ability of most producers of pig-iron to effect prompt delivery from stocks, buyers continue to specify only those tonnages which are required for immediate consumption.

The engineering and speciality foundries maintain their comparative supremacy in the production of castings compared with other types of foundries. Overall demands for high-quality castings are appreciable, with the motor vehicle trade the main consumer. That trade's schedule of requirements shows an increase on recent demands in many instances, and the foundries concerned are able to obtain satisfactory outputs. Some recovery in business has been made by the machine-tool industry and this has in turn benefited the foundries.

At the light-castings foundries the improved demand from the domestic utensil and building trades enables them to continue their improved production, but much more work could be undertaken, and this also applies to the jobbing and textile foundries, which are only moderately employed.

All foundries have no difficulty in obtaining the pig-iron they need. Low-phosphorus irons continue to be taken up in appreciable quantities and the increased tonnages of this grade now available are adequate to cover requirements. Hematite is plentiful and refined irons, when required, can be obtained without difficulty.

Increased activity continues at the re-rolling mills, and there is a substantial demand for small bars and light sections, and also for reinforcing rods, the re-rollers of which are very busy. The call for steel semis continues to expand, and most home steelworks are committed for their outputs for some time ahead. The re-rollers have meagre stocks on hand, as these had been kept at a low level, and difficulty is now being experienced in obtaining the billets and blooms required to undertake the urgent orders on hand. There is also a strong demand for arisings of suitable defectives and crops.

Non-ferrous Metals

The sharp drop in stocks of refined copper held in London Metal Exchange official warehouses last week appears to have put a "bottom" to the recent downward trend of prices. The fall in stocks totalled 1.850 tons, leaving total stocks at 12.813 tons, the lowest level since the week ended May 23, 1959. This decline is attributed to shipments made to the United States which have been taking place over the last three weeks, and underlines the present situation in America, where
75 per cent. of production capacity is still strik
Indeed, apart from one or two abortive overtures
and management are still as far apart as before
fast hardening belief now is that the present st
continue well into October.

At least 100,000 tons have already been lost
strike and it is reported that stocks in US pr
hands are now down to 92,175 tons. It is t
important to bear in mind that a continuatio
strike for very much longer must soon refle
in the price structure. This point can be st
the longshoremen come out on strike, thereby
out any chance of relief supplies pouring in fr
side America.

In the US, the custom smelters' quotatio
cents a pound still stands, as does the produce
of 31½ cents a pound. In the UK, the pric
to have grounded and, all points considered, th
tone is now firm enough to support a rising
prices. This could be well triggered off if the
contract negotiations taking place between
Copper and the labour unions in Chile brea
It is, however, expected that these negotiation
successful. On the other hand, the Braden min
have voted on a legal strike to take place next

Tin is still ploughing a steady furrow. T
increase in the export quotas has had no visibl
on the market, and with demand better from th
States and from the Continent, it is believed
buffer stock manager has been selling tin to
price down around its present level. The
quotation is not as buoyant as it has been
Stocks of tin in LME warehouses rose last
23 tons to 8,560 tons, the distribution bei
tons in London, 3,561 tons in Liverpool, and 1
Hull. In the US demand is improving and
is not far short of $1.03 a pound.

Lead has been a reasonably good market,
is too much metal about for this low level d
influence the price, which is now struggling
keep up to £70 a ton. In the US, the
featureless and the price is 13 cents a pound

Zinc, which has been a good market for m
both sides of the Atlantic, has, at last, been
by an advance of 1 cent to 12 cents a pou
electrolytic special high grade being quoted
cents a pound. The market in London rema
with metal not too easy to find at times.

House Organ

Newsletter, Vol. 11, No. 3. Issued by the Dav
group of companies.

The Editor of this house organ has indeed
task, as his readers are distributed over quite
of works. He rightly stresses the major
interest to all the staff—and the general publ
and reserves purely local news to the stating
facts. Very obviously pride of place in the
given to the Aston Martin racing-car vict
these cars gained first and second place at the
meeting. Also in the magazine is a note
demolition of the historic clock mill at Mel
seems vandalism to the reviewer to allow
which has given good service for 180 years
to the ground: surely it might have been a
decent funeral? During a visit by the M
Diocesan Industrial Chaplaincy to the Dav
Jackson works, the neophyte clergy were le
Mr. G. L. Hancock, general manager of the
division, thus reversing the usual order of th

Personal

Mr. J. T. **Ruffer** has been appointed chairman of the Lafarge Aluminous Cement Company, Limited, in place of the late Mr. J. G. **Kay**.

Mr. F. W. **James** and Mr. K. R. H. **James** have been appointed assistant managing directors of the Wolverhampton Metal Company, Limited.

Miss **Elizabeth** Cox, a member of the publicity department of the Carron Company, Falkirk, who are celebrating their 200th anniversary this year, has been chosen "Bicentenary Belle."

Mr. G. J. **Lyons** has been appointed secretary of the Institution of Plant Engineers in succession to Mr. R. F. **Farmer** who has resigned to take up an appointment with the Institute of Civil Engineers.

Mr. **Colin Leslie Forbes** has been appointed assistant managing director, and Mr. G. **Kershaw** has been elected a director of Greenwood and Batley, Limited, engineers, Armley, Leeds.

Twiflex Couplings, Limited, The Green, Twickenham, Middlesex, a member company of the Sheepbridge Engineering Group, announce the appointment of Mr. D. **Pooley** as their southern-area engineer.

Mr. **Arthur** G. **Davis**, sales director of Edwin Showell & Sons, Limited, brassfounders, Stirchley Brass Foundry, near Birmingham, for the past three years, has retired after 50 years' association with the company.

Following the appointment of Mr. R. W. **Kneeshaw** as managing director of Atlas Copco (NZ), Limited, Mr. K. G. C. **Nicholls** has been appointed manager of the Walsall branch of Atlas Copco (GB), Limited, in his place.

Mr. **Michael** J. **Stockwell** has been elected a director and Mr. **Geoffrey** B. **Hilton** appointed general manager of H. Stockwell & Company, Limited, iron and steel merchants and stockholders, Trafford Park, Manchester.

Crofts (Engineers), Limited, of Bradford, Yorks, announce the appointment of two additional representatives for the London area:—Mr. L. C. **Blake** and Mr. A. E. **Peggs**, both of whom will operate from 34, Norfolk Street, Strand, W.C.2.

Mr. P. **Rushworth**, director and secretary of W. C. Holmes & Company, Limited, Huddersfield, Mr. A. J. M. **Henshaw**, director and general sales manager of W. C. Holmes, and Mr. P. Croset, managing director of Holset Engineering Company, Limited, have been elected directors of B.H.D. Engineers, Limited.

Sir **James McNeill** is to relinquish the managing directorship of John Brown & Company (Clydebank), Limited, at the end of this month, but will remain on the board of the parent company, John Brown & Company, Limited. He is succeeded as managing director by Mr. **John Brown**, at present deputy managing director at Clydebank.

Mr. **John Bain**, A.M.I.MECH.E., president of the London branch of the Institute of British Foundrymen, has recently returned from a visit to Argentine and Brazil. Whilst in the Argentine, he had an opportunity of visiting 13 foundries and manufacturers of foundry plant, and on his way home, he visited a malleable foundry in Brazil. He had about 4,000 miles of interior travel, making a total round trip of approximately 16,000 miles.

Foundry Furnishings

Some ask for foundry core trays
And some for lift-out tongs
And others want our moulder's tools
Ladles, hooks or prongs.
But of all good foundry furniture
There's none that can compare
With HOOKER'S branded articles,
You'll find them everywhere.

Some call for dry or wet sand
And some for Die Slick pails,
And others want our wood flour
Rammers, forks or nails.
But of all good foundry rat catchers,
There's none that can compare
With HOOKER'S brand of ratting cats,
We've just a few to spare.

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Current Prices of Iron

(*Delivered*

Sept

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or ov Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent 6-ton lots or over, £23 5s. 0d., delivered Birmingh £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d. South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.0 per cent., 6-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 11s. 6d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 6-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 6d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy). —4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C,

---

* *Average* 68-70 per cent.

£1

mo

£22

rods,

Tin

£790

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to £6

£71 0s

Zinc

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Brass (B

Brass (H

£198; HTB

Gunmetal.

£246; G1, 1

Phosphor B

BS1400, 90/1

Leaded Phos

Phosphor Br

wire, 4s. 0d. p

cast bars: solid

LIMITED.)

Nickel Silver

0.056, 3s. 9½d.

cent.), 4s. 2½d.

½ in. dia., in st

Other Metal

Antimony, En

ex-warehouse,

Aluminium, ing

AB1, £228; AB

AJAX VIBRATION in FOUNDRIES

Conveying by vibration has proved both economical and efficient. At the same time the versatility of this method has impressed everyone who has witnessed its performance. Apart from conveying a very wide range of materials over long distances, many other functions can be performed whilst conveying. Among these are cooling, washing, drying, scalping, grading, and numerous others. It is this versatility that has led to the wide use of vibration in the Foundry Industry.

The Ajax Flexible Coupling Co. Inc., U.S.A. are recognised as being among the World leaders in Vibrating Equipment, and 'ACME' are their sole Licencees in this Country.

Photograph on left illustrates an AJAX VIBRATING CONVEYOR AND SCREEN *integrated into a sand conditioning system. Shakeout sand is fed to the* CONVEYOR *and oversize lumps are removed by passing the sand over a perforated plate. A magnetic Pulley at the discharge end removes metal particles.*

FOR FURTHER DETAILS WRITE FOR BULLETIN 307 TO:

ACME CONVEYORS LIMITED

ACME CHAMBERS, BRADFORD ST., WALSALL, STAFFS. *Tel.:* WALSALL 5183-4 *and* 6793 *Grams:* ACKNIGHT, WALSALL
ACME HOUSE, SEAWARD STREET, GLASGOW, S.1 *Tel.: South* 2875-6 *Grams:* ACKNIGHT, GLASGOW
Works at: Hillington, Glasgow

PIG IRON

Low Phosphorus
Refined & Cylinder
Hematite
Malleable
Derbyshire
Northamptonshire
Swedish Charcoal

Ferro Silicon *(12-14%)*
Alloys & Briquettes
N.F. Metals & Alloys
Limestone
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WILLIAM JACKS & Co., LTD.
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39, Corporation Street.
MIDLAND 3375/6.

Liverpool, 2.
13, Rumford Street.
CENTRAL: 3558

Glasgow, C.2.
93, Hope Street.
CENTRAL: 9969.

Notes from the Branches

South Africa

Dr. P. H. Riley, who has recently been appointed to the Foundry Sands Research Fellowship, was the lecturer at the August meeting of the South African branch of the Institute of British Foundrymen in Pharmacy House auditorium, Johannesburg. The president, Mr. K. H. Coombs, was in the chair and there were 60 members and guests present. The title of the lecture was "Foundry Sand Testing and Casting Defects."

In his opening remarks, the author assured his listeners that there was no intention to convey that there was a correlation between sand-testing and casting defects. Rather, the purpose of the paper was to deal with the types of defect which could be avoided by the modification of foundry-sand mixtures as a result of the correct interpretation of the results of sand testing. The active word in the foregoing statement being *interpretation*, for sand-testing as such was not a panacea for casting defects, and no amount of graphs, figures or results would save a casting from the scrap heap. The author then said that many foundries argue that the installation and operation of sand-testing equipment required specialized knowledge and was therefore expensive. The routine tests as described in the author's paper, however, were very simple—surely, the *most* expensive form of testing sand was to cast metal into it, he said!

General

In the first section of his paper, Dr. Riley stated that the tests to be recommended to any given foundry depended on the type of work on which that foundry was engaged, and the degree of its mechanization. The main body of the paper dealt with the common forms of testing used by foundrymen. Referring to mechanical analysis, it was pointed out that the surface definition of a casting can only be as good as that of its parent mould and thus, ideally, the magnified mould surface required to give a really flat casting surface should be a straight line. Only by the choice of the correct proportions of spherical particles of different sizes could this condition be approached, the appropriate test was classification of grain sizes by sieving. The sieve test was then described, but in conclusion a warning was given that this test on its own was not necessarily an indication that the sand was suitable for moulding.

Compaction

Compaction of sand was next dealt with, the author considering that tests for flowability were not to be recommended. The standard hardness test, although not proportional to mould density, was a good routine test where experience had shown that a good casting was obtained within certain hardness range, he said. Because of its simplicity, the green-strength was the most widely used in routine testing. The author remarked, however, that the information which it imparted was insufficient in itself, it must be used in conjunction with others. He said he considered that the moisture content was the most important property of a bonded sand for, if the clay and sand are fixed, as in many systems, upon it depends all the other properties. Methods of testing sands for moisture content were then described. Dr. Riley continued by saying that the usefulness of the shatter test should ensure that it finds routine application in the foundry. It had been suggested that this test measures either the ability of the sand to withstand deformation without failure, or the toughness of the material. From *theoretical considerations* it is known that both a brittle and a ductile material have low toughness values, and thus, as the water content in a sand increases, the shatter index should pass through a maximum. The maximum is in excess of the normal working moisture range in the case of clay-bonded sands, but can be demonstrated in synthetic resin-starch bonded core-sands.

Casting

Having discussed the moulding properties of sand with relation to the common tests for same, the author then dealt with the casting properties in so far as the material must be able to withstand the temperature of the metal, and should retain its moulded shape at least until solidification of the metal has taken place. It is also important, he said, that the air originally in the mould be completely replaced by metal. The following four properties were then enumerated: Refractoriness, permeability, expansion and dry-strength. In conclusion, Dr. Riley stated that the control of moulding materials in a foundry, by the intelligent interpretation of the more important sand tests, would lead to improvements in the finished article. A lively discussion ensued, and the vote of thanks was proposed by Mr. W. Brown.

Australia (Victoria)

In August, the Australia (Victoria) branch of the Institute of British Foundrymen held a joint meeting with the Australian Institute of Metals in the Metallurgy Theatre of the Royal Melbourne Technical College. The subject of "Heat-treatment of Various Castings" was dealt with in three papers, the first entitled "Steel Castings" was by Mr. A. M. Tennant (honorary member), chief metallurgist, Vickers Ruwolt Pty. Limited; the second, "Nodular Cast Iron" was presented by Mr. A. D. Main, B.MET.E., metallurgist, T. Main & Company, and the author of the last paper "Grey Cast Iron" was Mr. A. W. Silvester, chief metallurigst, Repco, Limited. The ensuing discussion covered such topics as comparison of grey cast-iron with steel, the importance of matrix composition, and stress relieving, annealing and hardening treatments.

Young People's Standards

"You are going to pass through a most exciting and exhilarating half-century before you slide gracefully into retirement about the year 2009," said Prof. H. C. Dent, Director of Sheffield University Institute of Further Education, recently. He was speaking to young apprentices and girls employed by Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, when he presented the firm's awards for further education.

Prof. Dent denied that standards of work, behaviour, and discipline were going down, but he warned that technical training alone did not produce the men and women of initiative, courage, and sympathy, the country needed. At present, he said, technical education was going through a process of gigantic reorganization and it was important that colleges should have the co-operation of firms in the task of training.

Presenting his report, Mr. R. S. Goodhind, personnel officer, said that as a result of the very large number of young people seeking employment, Newton, Chambers had had to restrict the area of recruitment, particularly for boys, very largely to the West Riding. An outstanding feature had been the increase in the standard, again particularly of boys, from secondary modern schools. It made selection more difficult, if more satisfying.

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Company News

METAL AGENCIES COMPANY, LIMITED—A one-for-five scrip issue is announced.

UNIVERSAL ASBESTOS MANUFACTURING COMPANY, LIMITED—The group has acquired the entire share capital of Chancery Insulations, a private company engaged in the specialist application of "Seel" asbestos spray.

HEPWORTH IRON COMPANY, LIMITED—Arrangements have been made for a placing of 896,147 ordinary 5s. shares. The issued capital consists of 2,400,000 ordinary 5s. shares. It is expected that the shares will be available at 5s. 4½d.

RICHARD LLOYD, LIMITED, manufacturers of machine tool equipment, etc., of Birmingham—Interim dividend for 1959 is 4 per cent. on the capital increased by a two-for-five scrip issue. This compares with an equivalent of 3 4/7 per cent.

C. A. PARSONS & COMPANY, LIMITED, engineers, turbine makers, etc., of Newcastle-upon-Tyne—The interim dividend is raised from 3¾ per cent. to 4⅜ per cent. for 1959. The 1959 effective total of 8⅛ per cent. included a special interim of ⅝ per cent. for the current year.

RIDGACRE FOUNDRY COMPANY, LIMITED—The company has been acquired by Triplex Foundry, Limited, Tipton (Staffs), for £47,000. Net assets at March 31, 1959, totalled £51,758, and the profit, before tax, for the year ended on that date amounted to £3,333, compared with £2,965 for 1957-58.

ARUSHA INDUSTRIES, LIMITED—The acceptance date of the company's offer for the ordinary shares in Webley & Scott, Limited, Birmingham engineers and machinists, has been extended to September 25. In a letter to 250 shareholders representing 184,109 shares in Webley & Scott, Franco-British & General Trust, Limited, urges rejection of the offer.

ASSOCIATED BRITISH ENGINEERING, LIMITED—It is not possible at present to foresee the time when ordinary dividends can be resumed, says the chairman, Mr. L. W. Robson, in his annual review. Group net loss for the year to March 31, 1959, was £99,251, against a profit of £30,277 for the previous year, when there was an interim dividend of 2½ per cent., but no final.

SOLAR INDUSTRIES, LIMITED (formerly the Aluminium Castings Company, Limited)—A final dividend of 10 per cent. makes a 15 per cent. total for the year ended March 31, 1959, against nil. Group trading profits improved from £170,691 to £287,769, after deducting losses of £71,685 (£88,705) of the Canadian companies. Group net profits of £121,169 compares with £45,291.

WILMOT-BREEDEN, LIMITED, manufacturers of automobile and domestic appliance accessories, etc., of Birmingham—The company has acquired a majority holding in France's largest manufacturers of locks, window regulators, and other components for motor vehicles, Autocoussin Dura, S.A. This company has a factory in Paris and a second plant at Evreux will be in full production by the end of 1960.

MUREX WELDING PROCESSES, LIMITED—The company has purchased the whole of the issued shares of Donald Ross & Partners, Limited, specialists in the design and manufacture of mechanical aids to production, of Crawley (Sussex). Donald Ross & Partners will continue to operate under the same name and the same management. The association will enable both companies to offer individually and jointly a first-class specialist service.

HAWKER SIDDELEY GROUP, LIMITED—Philip Hill, Higginson & Company, Limited, announces that its offer on behalf of the Hawker Siddeley Group to purchase for cash at 10s. 6d. a share all the issued share capital of Folland Aircraft, Limited, has been accepted by holders of 1,408,604 shares, equivalent to 90.87 per cent. of the total, and has, therefore, become unconditional. Philip Hill, Higginson & Company will continue to receive late acceptances.

ALUMINIUM CORPORATION, LIMITED—For the seven months ended July 31, 1959, the corporation is paying a dividend of 10 per cent. and a golden jubilee bonus of 5 per cent. As a result of the acquisition of the British Aluminium Company, Limited, by Tube Investments, Limited, the financial year of the group has been altered so as to end on July 31. For 1958 a dividend of 17½ per cent. was paid by the Aluminium Corporation. Net profits for the period amounted to £55,337, compared with £81,596 for 1958.

GEORGE KENT, LIMITED, industrial instrument and automatic control manufacturers, of Luton (Beds)—The directors announce that in the recent issue to ordinary stockholders of 540,000 10s. ordinary shares at 30s. per share, 529,766 shares, representing over 98 per cent. of the issue, were taken up under provisional allotment letters, leaving 10,234 shares available to meet over 550 applications for additional shares totalling 201,209 shares. The general basis of allotment of the additional shares was as follows:—Up to 15, in full; over 15, 15 shares. Preferential consideration was, however, given to applications received from the company's employees.

HALESOWEN STEEL COMPANY, LIMITED—Profits for the year to date exceed the comparable figures for last year, says the chairman, Mr. C. S. Burch. In view of this and in order to bring the issued capital more into line with asset values, it is proposed to make a one-for-five scrip issue. The interim dividend is repeated at 4 per cent. and in the absence of any unforeseen circumstances the board hopes to maintain the final dividend of 8 per cent. on the increased capital for 1959. An extra-ordinary meeting to pass the increase in the authorized capital to £315,000 and approve the capitalization of £40,000 from the general reserve will be called for October 16.

QUALCAST, LIMITED, light repetition engineers, lawn mower manufacturers, etc., of Derby—Group trading profits rose to £1,548,778 (£1,414,114) in the year ended June 30, 1959 and a final dividend of 15 per cent. is announced on the ordinary capital to be increased to £1,724,978 by the recently proposed one-for-10 scrip issue. This makes the total dividend equivalent to 26½ per cent. on the smaller capital, compared with 24 per cent. previously. In addition, there is a 3 per cent. (nil) capital distribution on the increased ordinary capital payable from profits, mainly derived from the sale of trade investments. After all charges, the net balance is £632,360 (£504,615).

Board Changes

ASSOCIATED BRITISH ENGINEERING, LIMITED—Mr. H. I. Wonfor has been appointed to the board and Mr. E. M. Benjamin has resigned his directorship.

RUSTON-BUCYRUS, LIMITED—Mr. Robert G. Allen, president of Bucyrus-Erie Company, of South Milwaukee, Wisconsin, USA, has been appointed a director and has been elected chairman of the board, to fill the vacancy caused by the resignation for health reasons of Mr. William L. Little.

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AP94

Pig-iron and Steel Production

Statistical Summary of May Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in May. Table 3, weekly average production of finished steel in April. Table 4 gives the production of pig-iron and ferro-alloys in May, and furnaces in blast. (All figures are weekly averages in thousands of tons.)

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100.			Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials excl. fuel[1]						Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[3]
1957	328	488	537	325	303	270	275	220	14	417	322	1,444
1958	343	503	478	276	262	227	245	196	9	369	284	1,542
1959—Mar.[4]	342	502	473	276	217	195	221	195	7	363	266	1,479
Apl. ..	342	504	477	299	219	201	231	211	9	387	297	1,458
May ..	342	487	478	292	236	203	240	211	8	385	285	1,457

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in May, 1959.*

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derbys, Leics., Notts., Northants, Essex ..	—	4.1	15.2 (basic)	1.8	0.1	19.9	1.3	21.2
Lancs. (excl. N.W. Coast), Denbighs., Flints., Ches. .. .. Yorks. (excl. N.E. Coast and Sheffield)	0.8	33.0	—	4.9	0.2	37.8	1.1	38.9
Lincs.	—	44.0	—	—	0.1	44.0	0.1	44.1
North-East Coast	0.7	64.7	—	1.1	0.3	65.3	1.5	66.8
Scotland	1.4	31.4	—	2.1	0.1	33.2	1.8	35.0
Staffs., Shrops., Worcs., Warwicks.	—	17.2	—	3.8	0.7	20.1	1.6	21.7
S Wales and Monmouthshire	1.9	92.3	7.2 (basic)	0.7	0.1	101.9	0.3	102.2
S. effield (incl. small quantity in Manchester) ..	7.4	31.8	—	10.6	0.2	48.5	1.5	50.0
North-West Coast	—	0.8	3.3 (acid)	0.5	0.1	4.6	0.1	4.7
Total	12.2	319.3	25.7	25.5	1.9	375.3	9.3	384.6
April, 1959	11.5	322.2	25.3	26.2	2.1	377.4	9.9	387.3
May, 1958	14.8	317.1	23.7	21.2	2.2	368.5	10.5	379.0

TABLE 3.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1957.	1958.	1958.	1959.	
			April.[4]	March.[4]	April.
Non-alloy steel:					
Ingots, blooms, billets and slabs[5]	5.0	4.6	5.1	4.1	6.0
Heavy rails ..	11.2	10.2	11.8	7.3	8.2
Sleepers	1.3	1.2	1.5	0.7	1.5
Fish and soleplates	0.8	0.7	0.9	0.3	0.5
Plates:					
(i) ⅛ in. and over	34.0	29.6	33.5	25.1	25.4
(ii) Under ⅛ in.	20.3	17.7	18.6	17.2	17.4
Other heavy prod.	53.0	41.8	54.7	35.5	39.9
Ferro-concrete bars	8.9	7.6	6.9	7.8	8.7
Wire rods	23.3	21.5	18.8	21.1	24.6
Arches, etc. ..	11.0	8.6	10.4	8.7	8.9
Other light sections	38.7	29.1	30.5	28.5	32.6
Bright steel bars ..	7.0	6.2	6.2	6.3	7.7
Hot-rolled strip ..	23.1	22.6	22.0	26.7	27.3
Cold-rolled strip .	7.1	7.0	7.3	7.0	7.8
Sheets, incl. coated:					
(i) Hot-rolled ..	13.0	10.6	11.5	10.8	10.4
(ii) Cold-reduced	29.1	31.1	29.4	33.3	38.8
Tinplate:					
(i) Hot-dipped	11.3	8.4	9.0	6.4	7.7
(ii) Electrolytic	7.5	10.3	10.6	12.5	13.8
Blackplate .	1.0	0.8	0.9	0.7	0.6
Tubes up to 16 in.	22.1	19.0	18.3	18.4	20.9
Tube, pipe fittings	0.5	0.4	0.3	0.4	0.4
Tyres, wheels, axles	5.1	4.5	5.0	3.0	3.0
Forgings (excl. drop)	3.1	2.6	2.8	2.0	2.4
Steel castings	4.6	4.2	4.3	3.7	3.9
Tool and magnet	0.3	0.2	0.2	0.2	0.2
Total .. .	342.3	300.5	320.5	287.7	318.6
Alloy steel .. .	17.8	16.1	16.1	17.0	19.1
Total deliveries from UK production[6]	360.1	316.6	336.6	304.7	337.7
Add: Imported finished steel .	9.6	7.1	7.2	6.3	9.7
Deduct: Intra-industry conversion[7]	48.2	41.2	41.9	46.1	51.1
Total deliveries new *material*	321.5	282.5	301.9	264.9	296.3

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys, Leics, Notts, Northants and Essex	19	—	24.5	15.8	1.4	—	41.7
Lancs (excl. N.W. Coast), Denbighs, Flints, and Ches .. Yorks (excl. N.E. Coast and Sheffied)	7	—	19.9	—	—	1.8	21.7
Lincs	8	—	41.9	—	—	—	41.9
North-East Coast	17	2.8	42.1	—	—	0.8	45.7
Scotland	6	0.6	13.6	0.5	—	—	14.7
Staffs, Shrops, Worcs, Warwicks	4	—	5.7	0.9	—	—	6.6
S. Wales and Mon	10	3.7	47.2	—	—	—	50.9
Sheffield	2	—	3.6	—	—	—	3.6
North-West Coast	7	11.9	—	0.1	—	1.7	13.7
Total ..	80	19.0	198.5	17.3	1.4	4.5	240.5
April, 1959 ..	79	20.4	189.3	18.5	0.2	2.9	231.3
May, 1958 ..	90	23.9	195.0	26.0	0.2	4.5	249.6

[1] Used in non-food manufacturing industries.

[2] Weekly average of calendar month.

[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.

[4] Five weeks, all tables.

[5] Other than for conversion into any other form of finished steel listed.

[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.

[7] Material for conversion into other products also listed in this table.

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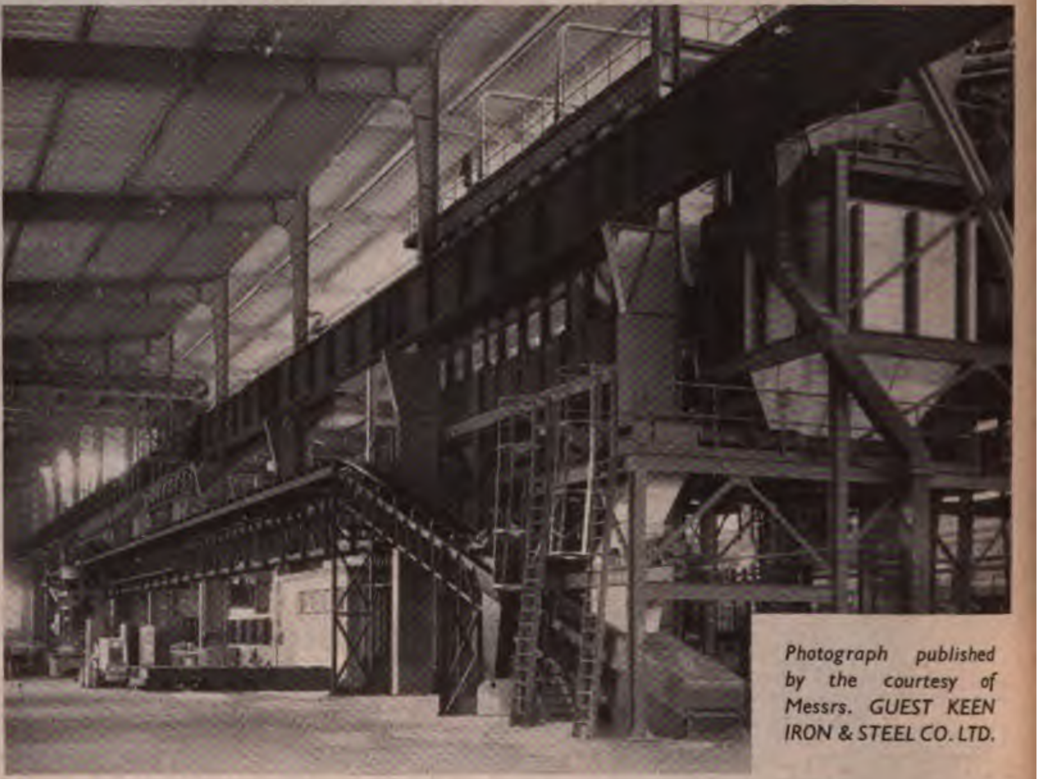

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FOUNDRY
TRADE JOURNAL
Vol. 107 OCTOBER 1, 1959 No. 2234

Two-hundred-and-fifty Years

This year is being marked by celebrations of two events which took place a quarter of a century ago. The first, of more academic interest, was the birth of coke-fired blast furnaces and the second, the formation of the Coalbrookdale Company. The former was commemorated last week by the presentation of a number of lectures, a banquet and a visit to the works at Coalbrookdale. The second is being marked by the opening at the Coalbrookdale works by Allied Ironfounders, Limited—the parent company—of a museum and a furnace site, the latter being used in its archaeological significance because actually " old " and " new " furnaces have been laid bare by excavation. This alone makes the exhibits of outstanding interest to all those who seek to enhance their knowledge of the history of ironfounding. The excavated and restored area together with the excellent museum which has been formed and is now open to the public, will make Coalbrookdale a Mecca for industrial historians for evermore.

It is difficult to establish from the records available whether or not Abraham Darby I was the first man to use coke as fuel for a blast furnace, as in 1709 metallurgical experiments were not publicized. However, as his furnace was used for the dual purpose of making pig-iron and cast iron, at the very least he can be credited with this notion. He started casting in the January and no doubt accumulated stocks of pig-iron. Whilst direct metal was probably used for the making of heavy-section castings, remelted metal was preferred for making his light-section cooking pots. No doubt, also, the size of the stockpile would, to a large extent, govern the furnace charge for any particular melting programme. It would seem that this early " marriage " of iron and steel with the foundry industry has never, in the eyes of those outside these industries, resulted in a divorce, so that only too often the two industries are regarded as one.

The papers presented on the 250th anniversary of the successful use of coke in ironmaking form an invaluable and readily available record for those of future generations who are delving into the history of the industrial revolution. From one of these papers, it is made clear that Abraham Darby I was also the father of the UK brassfoundry industry. This work was carried out at Bristol, where he not only made brass pots and pans, but also established a wire industry. There are many facets worthy of study in the various documents issued in connection with these celebrations, such as the benefits to be derived from the solution of transport problems, the employment of the best artists of the day as industrial designers and adaptation to modern conditions. If, unlike Wilkinson, the Darby family had had no religious scruples and had manufactured armaments, we wonder if the wealth which would have accrued would have resulted in further important industrial developments.

Combustion Engineers' Conference

The technical and economic aspects of the use of automatic controls on medium-size and solid-fuel-fired boiler plant, and the development and improvement of fully-automatic coal-fired boiler plant are subjects which will form the basis of papers and discussions at the Conference of the Combustion Engineering Association to be held at the Royal Hotel, Scarborough, on November 3 and 4. The Conference is to be opened by the Worshipful Mayor of Scarborough, Councillor J. Kennedy, J.P., at 9.30 a.m. on the Tuesday, and in addition to technical sessions, a civic reception (by the Mayor and Corporation of Scarborough at 8.30 p.m., on November 3), and a dinner (8.0 p.m. at the Royal Hotel on November 4) will be included in the event.

Opening speakers will deal in general with automatic operation of boiler plant, and give requirements to be fulfilled, subsequent speakers will deal with the technical aspects, and a final session will be devoted to an economic assessment of the use of automatic handling and control equipment. Papers to be presented include: "Why Automatic Operation" by R. H. E. Thomas; "What is Needed to achieve Automatic Operation," by B. E. A. Vigers; "Fuel and Ash Handling" by F. S. Stent; "Combustion and Mechanical Firing" by M. V. Murray; "Automatic Control Equipment," by J. S. Hales; and "Present-day Practice in Automatic Control," by I. W. Stevenson. Whole sessions will be devoted to discussion of the papers.

Founders have a dual interest in the Conference, first in the technical aspects of combustion efficiency and instrumentation, and second, that automatic-firing plant for using coal inevitably involves the considerable employment of cast components. The Conference will be open to non-members, and those wishing to participate should make early application to the secretary of the Association at 70, Jermyn Street, London, S.W.1.

Forty Years Ago

An article in the October 1919 issue of the JOURNAL carried the title "Foundry Comparisons" and in it the author, Mr. H. G. Barrett, described and illustrated an atmospheric feeder-head which, apparently, was re-invented during the second world war by American foundry research workers. Mr. Barrett, however, failed to disclose the fundamental principle of the system, for he described the connection between the feeder-head cavity in the mould and the open air as a vent, instead of a channel through which atmospheric pressure could exert its effect. Amongst new companies listed in this issue were Greenside Foundry Company, Limited; Premier Aluminium Casting Company, Limited; Foundrometers, Limited; and G. M. Hay & Company, Limited (registered in 1939)—the first Meehanite licensee.

Latest Foundry Statistics

Copper-base Castings: That there has been no improvement in the production of copper-base castings is shown by the latest figures published in the *Bulletin* of the British Bureau of Non-Ferrous Metal Statistics. The July output was 5,720 tons and for the first seven months of the year it was 42,365 tons. The latter figure compares with 42,897 tons for the corresponding figure of last year.

Forthcoming Events

OCTOBER 3

Institute of British Foundrymen

Wales & Monmouth branch: Works visit to Black Clawson International, Limited, W. A. Baker section, Newport, 2.45 p.m.; tea at 5 p.m., followed at 6 p.m. by "Modern Methods in Pattern Production," by B. M. S. Perry

OCTOBER 5

Institute of British Foundrymen

Sheffield branch: Presidential address and dinner at the Sheffield and Ecclesall Réstaurant (details from secretary).

OCTOBER 6

Institution of Plant Engineers

Edinburgh branch: "Changes in Factory Legislation," by A. Gow (H.M. Inspector of Factories), 7 p.m., at 25, Charlotte Square.

OCTOBER 7

Combustion Engineering Association

Scottish region: Brains Trust on "Clean Air and Industry." 10 a.m.; 2 p.m., Discussion on "Instrumentation and Smoke Control," opened by P. J. Turner. Meeting to be held at the Grand Hotel, Charing Cross, Glasgow.

Institution of Production Engineers

Dundee section: Numerical Control of Machine-tools." by Mr. Brett and Mr. Tack, 7.30 p.m., at the Windmill Hotel, Arbroath.

Institute of British Foundrymen

Southampton section: "Some Aspects of Small Foundry Practice," by F. P. Robinson, 7.30 p.m., at the Technical College, St. Mary's Street.

Institution of Plant Engineers

Southern branch: "Town Planning and the Location of Industry," by R. J. Roddis, 7.30 p.m., at the Polygon Hotel, Southampton.

OCTOBER 8

Institution of Production Engineers

Leicester section: Evening visit (7.15 p.m.) to the Imperial Typewriter Company, Limited, East Park Road, Leicester, followed by lecture "Production-control System at the Imperial Typewriter Company," by B. S. Pears.

OCTOBER 10

Institute of British Foundrymen

Scottish branch: Presidential address followed by "Some Aspects on the Manufacture of Cast-steel Axle Boxes,' by J. McConnell, 3 p.m., at the Royal College of Science and Technology, Glasgow.

POA Annual Conference

Speaking at the recent annual general meeting of the Purchasing Officers' Association, held during the Annual Conference at Folkestone, Mr. W. H. Parry, national chairman, said that there had been a substantial increase in membership, and this despite the fact that steps were being taken to base entry upon examination qualification. More than 1,000 registered students were now preparing for the examinations. He went on to say that during the year, a certificate in store-keeping had been introduced and in addition the Association had continued to provide a programme of senior courses. The Association had also continued to be active internationally and had played a leading part in the formation of the European Federation of Purchasing.

In his presidential address, Mr. C. F. Huebner called buyers' attention to the dangers of over-ordering, and pointed out that past experience showed that high stocks were accompanied by long delivery dates. The service factor in buying was also one which should never be neglected. He concluded by referring to price cutting, which he thought should not be carried to extremes, although buyers should lose no reasonable opportunity for keeping prices down.

Coalbrookdale
1709
to
1959

By Dr. A. Raistrick

This history of Coalbrookdale Company, Limited, of Wellington, Shropshire, covers a period of two-and-a-half centuries—their 250th anniversary cannot but give pause for reflection on the progress that has been made during that period. Few industries can look back on greater changes than have been experienced by iron founders. To mark their appreciation of the company's long and distinguished record, Allied Ironfounders, Limited, have made possible the preservation of the Darby Old Furnace (1777), and the display of some of the Company's records and achievements. The following article is an abridged version of Coalbrookdale's life story, as told in a brochure issued by Allied Ironfounders.

The first Abraham Darby, who founded the present works of Coalbrookdale Company, Limited, came from a family whose home was at Sedgley near Dudley. His grandfather and father, both called John, had worked a small farm and carried on the trade of locksmith, and his father had joined the Society of Friends called Quakers. His mother and stepmother were also Quakers. Born in 1678 he was apprenticed in 1691 or 1692 to Jonathan Freeth of Birmingham, also a Quaker, a maker of malt mills and small machinery. In his apprenticeship Darby became familiar with two matters which were to be of great importance in his later work, the art of working iron and steel and the use of coke as fuel in malting. In 1699 he married Mary Sergeant and moved to Bristol, where he set up first as a malt-mill maker, then in 1702 formed the Bristol Brass Wire Company in partnership with a number of other Quakers. Two years later he turned his attention to the making of brass pots, then after a visit to Holland began the experiments which finally led in 1707 to the patent for casting *iron* bellied-pots in dry sand, and in particular to the art of casting them thin and light.

ABRAHAM I's FIRST STEPS

In 1708 Abraham was looking for a furnace of his own to develop ironfounding, and after examining the furnace in Coalbrookdale, took it on lease, and in the next year began to smelt iron ores using coke as his fuel. The success early in 1709 of this new method is one of the events being celebrated in this year 1959. The choice of Coalbrookdale, which he heard of from Richard Corfield, was probably influenced by Darby's knowledge of the coke made from one of the coals occurring there, the Clodd coal, and also by the town's position on the excellent waterway of the Severn, which linked it with the group of Quaker merchants in Bristol who were already interested in the iron trade. Coalbrookdale had been an area of ironworking and making long before Darby knew it. In 1638 Sir Basil Brooke had a furnace built in the Dale (the Old Furnace) and smelted iron ores with charcoal by the same methods he had used for twenty years at his furnaces in the Forest of Dean. The furnace had a chequered career until the great floods of 1706, when the pool dam burst and the furnace flooded and blew up, so that when Darby took it over he had to do considerable repairs to the hearth, and provide new bellows. In the country in and around Coalbrookdale there were at that time at least eleven forges, which took some iron from local furnaces and supplemented this with pig-iron from the Forest of Dean. When Darby repaired the furnace in 1708 and began casting pig-iron in 1709 he used his output for casting pots and other articles, and for a small supply to Bristol. He did not enter into trade with the local forges.

Birth of "Family" Tradition

Darby no doubt employed some of the men who had worked at the old furnace, but he also brought some of his own workmen with him from Bristol and so introduced names which are still remembered in the area. His stepmother was Joan Luccock, John Darby's second wife, who came with her

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The picture at the top of this page shows a cast-iron statue, 7 ft. wide by 8 ft. high, of Cupid and the Swan. Originally made by the Coalbrookdale Company for the Great Exhibition of 1851, it now stands near to the 1777 old furnace.

Coalbrookdale 1709 *to* 1959

husband to the Dale in 1709, and her nephew, Thomas Luccock, was, in 1714, indentured to Abraham Darby I. In the nineteenth century the family was still in the district and Ann Luccock became the mother of W. G. Norris, a manager of the Company, members of the Luccock family having worked in the Dale for over two centuries. The families of Thomas and Rose also came with Darby. The fact that many of the workpeople were Quakers, and that there was some degree of relationship between many of them, helped to establish the friendly "family" tradition that has always been characteristic of the works. Abraham Darby, amidst all the activity of establishing the business, was very active in the affairs of the Society of Friends attending meetings in Newport and Broseley, where the Meeting House was built in 1690. The business of the meetings brought him into close and frequent contact with many Friends such as the Lloyds, Crowleys, Milners, Osbornes, Goldneys and others who were also interested in iron, and he had many opportunities to talk over things with them. There is abundant evidence that the group of Quakers in the Severn and Border country and in North Wales formed a closely bound community within which there was a considerable interest in iron making and the iron trade. Abraham I died in 1717 and was buried in the Broseley Meeting House Ground, leaving his widow with six children, survivors of the ten born to them. Mary, the eldest, married Richard Ford, clerk in the works, and on her mother's death in 1718, she took the oversight of the children with Richard Ford, Thomas Goldney and Joshua Sergeant as Trustees for them. Ford took the management of the works in partnership with Thomas Goldney, who came up from Bristol for a while, and under their care the works were extended. When Ford entered on the management an inventory was taken which gives a good idea of what buildings there were in the works and helps to picture the general appearance of the Dale. There were now two furnaces, for Abraham I had started to build his second, the Lower Furnace, in 1715; there were three moulding shops, three air furnaces, a warehouse, a smiths' shop, carpenters' shop, dressing room, store room, a copper house, office and a few other small buildings. There were also three forges, the "Lower Forge" forming the nucleus of Dale End.

Steam-engine Castings

The work of founding was shared between the two furnaces and the three air furnaces, and pig-iron, pots, pipes and pumps were being produced. Before long the first steam-engine cylinder was cast at the Old Furnace. There was now the prospect of an increased trade, as the steam engine was well established in the mining fields, and cylinders of cast-iron were much cheaper than the earlier ones of brass. The demand for pig-iron among the Bristol merchants was growing, and the pot trade was extending both by sales to smaller customers at the fairs and to a few wholesale customers like the Champions, Ives, Jukes and others. Ford and Goldney leased two new furnaces, Bersham and Willey, in 1732 and so released the Old Furnace for the expected steam-engine work, transferring some of the pot casting to Bersham. The men in charge of the Old Furnace were now Crannage and Parker and at the Lower Furnace, Onions and Slicer. It was the foresight of Ford and the financial help of Goldney that brought the concern through a period of difficulties and experiments into a successful condition in the middle 1730s.

ABRAHAM II

Abraham II left school and went into the works. In 1732 he began to act as assistant to Ford, and in 1734 was a partner in the new tenancy of the works; in 1736 he was brought into full partnership and the business was renamed the Dale Company. Edmund Darby, brother of Abraham II, had a small interest in the works and acted for some time as a traveller to the fairs, but developed a business of his own as a general merchant which he continued alongside his work in the Dale Company. He was killed in a riding accident in 1756.

Steam Pump Installed

During Ford's management there were some important changes in the works; the furnaces had formerly worked to a great disadvantage because of an insufficient water supply through part of the year, which meant that the bellows could not be worked to the capacity needed for a full blast. Ford built horse-driven pumps which returned water from the tail of the wheels into the ponds, so that it was used over and over again. Abraham II, in 1742, replaced the horse-driven pumps by some driven by a steam engine which was built in the works. He also took over part of the management in 1738 and during the next 10 years secured leases of iron and coal mines in Lawley, Dawley, Lightmoor and Coalmoor. In 1748 he began the construction of wooden wagon ways between these and the works. This was the beginning of the extensive system of wagon ways which Richard Reynolds, 20 years later, relaid with the world's first cast-iron rails.

Gun Trade Stopped

During the management of Ford and Goldney the company took part, for a few years, in the unQuakerly gun trade, but when Abraham II took charge the casting of guns was stopped. The demand on the furnaces was increasing and in 1755 and 1756 Abraham II had new furnaces built at Horsehay and Ketley, and in the next few years at Madeley Wood, Dawley Castle and Donnington Wood, and made in them a pig-iron suitable for conversion to bar iron. Some of the best known ironmasters of the Midlands, Knight, Foley, Lloyd and others, became his customers, and forges were developed at Horsehay and Ketley so that the company now had three large works as well as iron and coal mines, and was one of the largest in the country. Richard Reynolds came from Bristol in 1756 and took over the management of the Ketley works.

Workers' Houses Built

With the great increase in the number of workmen, Darby turned his attention to their social needs. In the succeeding years he and Reynolds built many groups of workpeople's houses in the Dale, at Horsehay and Ketley, and a little later, on the New Dale estates at Dawley. The Friends Meeting House in Coalbrookdale was built in 1745 and extended in 1763, another being built at New Dale in 1759. The building programme had already included schools, repairs to a schoolhouse being mentioned in the accounts as early as 1718, and throughout the company's history, the education of its workpeople's children was cared for. An idea of the appearance of the Dale can be obtained from the Plan of Coalbrookdale 1753, which is still in the works. A great mass of buildings was clustered around the Upper (Old) Furnace in the area between the Upper Pool Bank and the present road through the works leading on to Darby Road; this is the area now cleared as a surround for the Old Furnace. In the furnace area the crowded mass of buildings included air furnaces, moulding shops, blacksmiths' shops and many other small buildings. Next in the Dale below Upper Furnace came the Lower Furnace Pool, and the Lower (New) Furnace with its moulding houses, warehouse and blacksmiths' shop. The Upper Forge Pool, the largest of the three pools, separated Lower Furnace from the Upper Forge. Wagon ways ran all through the works and down the road to Lad Croft Wharf (sometimes known locally as Severn Wharf), and up the Dale into the Loam Hole, and also by Jigger's Bank to the many iron and coal pits beyond the Dale Head.

ABRAHAM III TAKES OVER

Abraham II died in 1763, but from 1756 had the help and friendship of Richard Reynolds, who married his daughter Hannah in 1757 and in 1762 bought a half share in the Ketley works. Reynolds took over the management of all the works until Abraham III was of age in 1768, when he returned to the management of the Ketley works. In the years 1758 to 1768 the company was expanding beyond the Dale with forges at Bridgnorth and Liverpool and agents in Cornwall, London and Newcastle-upon-Tyne. The forge at Liverpool, founded in 1758, became eventually the engineering firm of Fawcett-Preston, while the Carron Ironworks was started in 1759 with the help of skilled workmen from Coalbrookdale, one of whom later took part in the Perran Foundry development in the south. By 1758 the company had cast more than 100 steam cylinders, and had built a great many complete engines. Abraham III continued his father's interest in this work, and found an able supporter in Richard Reynolds' son William, who took the management of Ketley about 1777, and who, with Darby, built several Boulton & Watt engines for the works, under licence from the patentees.

World's first Cast-iron Bridge

The event most publicized in this period of the

View of Abraham Darby's "Old Furnace" (glass roof added) and its surrounds at Coalbrookdale, in Shropshire.

Abraham Darby's "Old Furnace," as seen from the casting floor. It was redesigned in 1777 for casting the iron bridge for the River Severn.

Works' story was, of course, the building of the Iron Bridge over the River Severn, the first cast-iron bridge in the world. It was cast at the Old Furnace, and after its erection the Gold Medal of the Society of Arts was presented to Abraham Darby. It seems now fairly certain that the bridge as it stands was Abraham's design, but the idea of using cast-iron for a bridge probably belongs to the architect Pritchard. It was for the bridge castings that the Old Furnace was re-designed and built in its present form. Abraham I's furnace was on the same site and was essentially the original charcoal furnace of 1638, repaired and improved time after time. The foundations now exposed on the west side of the base of the Old Furnace probably belong to the 1638 structure. The rebuilt furnace incorporated cast-iron beams from the first one, with the cast-on inscription B E w 1638 E w B, though the letter B is seen really to be a monogram combining a B and an L, and the w is probably a crown. The newer beams carry the inscription ABRAHAM DARBY 1777. The members for the bridge structure were cast in open sand moulds on a floor prepared on the east side of the furnace, and the method of their casting can still offer a puzzle to the founder who considers their great length of 70 ft., and their small section, with the great uniformity which their heavy loading demands. Some 378 tons of members were sent from the Dale to the site of the bridge, and for three months the work of erection went on "without any accident either to the work or the workmen, or the least obstruction to the Navigation of the River." After the bridge was opened, it became one of the sights for tourists, and many famous people visited it and made notes and descriptions in their diaries. This was the beginning of a long connection with bridge building, the Buildwas Bridge and the Albert Edward Bridge, also over the Severn, being two local examples of which the former has been replaced by a newer structure.

Inventions

The reputation of Coalbrookdale was growing among engineers, and many experiments were made there both by people in the works and by visiting engineers who brought their ideas to be tried out. Adam Heslop, who was apprenticed in the works, invented the Heslop engine, of which several were made and used about the Dale, then set up a business for himself in Cumberland and supplied numbers of his engines to collieries in the North of England. Sadler, the first balloonist, had his invention of an improved steam-engine built in the Dale, and several of these were made for use at the works and collieries throughout Shropshire. Visiting engineers included such men as Hornblower, with his improved steam-engine, and Telford and Trevithick.

Telford

Telford, who came to the area in 1787 and got to know the Company while acting as Surveyor of Public Works for the County of Salop, was responsible for the county bridges. The inclined planes were invented by William Reynolds in the course of the canal which he was building for the Company; they were used for lowering boats from one level to another of the canal, or from the canal to the river side. Of equal importance was the cast-iron aqueduct made by the Company to carry the Shrewsbury canal across the valley of the Tern at Longdon, the success of which persuaded Telford to use cast-iron troughing on his famous Pont Cysylte and Chirk aqueducts on the Ellesmere canal.

Trevithick

Trevithick knew the Dale through its steam-engines, which were working at many Cornish mines, and through his friendship with the engineer Hornblower visited the district in 1796. After his famous road-engine experiment at Redruth, on Christmas Eve, 1801, he came to the Dale in January, 1802, to test his high-pressure boiler and engine. The Company had made boiler plates for half a century, and their haystack boilers were widely known. Trevithick wanted to build a locomotive to run on rails. In 1802 folk in the Dale, with a crowd of local engineers, were able to watch the splendid performance of the high-pressure boiler and engine made for Trevithick, which in part of the test took steam at 145 lb. per sq. in. pressure, which was incredible at the time. The locomotive was built, and was the first successful locomotive built to run on rails, thus creating another world record for the Company. Others were built for Trevithick and for the Company's own use, and an engine was even tried out in a boat, which was propelled at seven miles an hour. In the years following these experiments the Company built many high-pressure engines on the Trevithick plan.

REORGANIZATION AFTER ABRAHAM III's DEATH

When Abraham III died in 1789 the finances of the Company were in a poor order, as they had kept clear of work connected with the war, which could have brought them large profits. Richard Reynolds helped them with big loans and easy leases, and in 1790 some reorganization was started. Richard Dearman became manager until 1803 when Edmund Darby, nephew of Abraham III, took charge. Dearman's sister was daughter-in-law of Richard Reynolds, so Dearman was not a stranger to the family of Darby. He had been partner and manager of Dearman & Freeth, of the Eagle Foundry, Birmingham. In the next few years there was a thorough reorganization of Coalbrookdale, Horsehay and Ketley and their associated mines and furnaces, and in 1797 the Ketley section was renamed W. Reynolds & Company, though Coalbrookdale held half the shares and there was joint management. Horsehay and Coalbrookdale were united under a new name, "The Coalbrookdale Company." The works were now equipped as follows:

Coalbrookdale: small furnaces, foundry, light rolling-mills and forge, engine shops and timber yard.

Horsehay: larger furnaces, heavy rolling-mill and forge, boiler shop and brick yard.

Ketley: furnaces, light rolling-mill, engine and wagon shops.

Associated with the works were also a larger group of furnaces with two at each of the following places, Madeley Wood, Lilleshall, Donnington Wood, Dawley Castle and Lightmoor. Engine work was mainly done at Coalbrookdale and Ketley, and blooms were rolled at Coalbrookdale and Horsehay. The rolling mills had been built at Coalbrookdale in 1784 and at Horsehay and Ketley in 1789. At Horsehay boiler-plates were being rolled, a most important innovation which soon led to an extended activity. The Company had a steady output of boilers, many of them made to the customers' drawings or special requirements, and many of large size.

Period of Distress

In 1795 and 1796 there was throughout the country a period of distress caused by high prices and scarcity of food—in some parts there was rioting among workers. The Coalbrookdale and Ketley Companies, along with two neighbours, the Old Park and Snedshill firms, subscribed £8,000, with which stocks of rice and corn were purchased and resold to the workpeople at three-quarters of the cost price. The Dale Corn Mill was built to produce flour from the corn and so avoid any exploitation by millers. This help in obtaining reasonably priced food, along with the many allotments provided by the Company, helped the steady work of reconstruction to proceed without any rioting in this area.

Temporary Close-down

Until 1810 the works was kept busy with a variety of productions: engines, pig-iron, bars, castings, pots and hollow castings. However, by 1812, there was a period of depression in trade and the Coalbrookdale furnaces were closed down, along with one at Horsehay, while Ketley works closed down in 1816. Francis Darby, son of Abraham III, had been in charge at the Dale from 1810 and it is to him, after the long depression, that credit goes for one of the best known of Coalbrookdale's special lines, that of art castings. Richard, his brother, took part interest in the Dale, but was more actively busy in work for the abolition of the slave trade, and in other philanthropic causes. In 1810 Horsehay and the outlying furnaces were put in charge of Edmund Darby's brother-in-law, Barnard Dickinson, who managed them until 1827. Dickinson had the hard task of carrying these works through a period of great depression, and only succeeded in this by introducing many economical methods of working and by extending the variety of work undertaken. While Horsehay was kept in full work the Dale works were somewhat neglected, and experienced their quietest period until a revival began about 1833; it had even been suggested in 1825 that Coalbrookdale might be given up and all the work concentrated at Horsehay and Lightmoor. Two years later, however, a lease of the whole concern was renewed.

Developments at Horsehay

At Horsehay, Abraham IV and Alfred, the sons of Edmund Darby, followed Barnard Dickinson as joint managers and very soon developed their own particular interests. Abraham took a keen interest in the mines and in all technical problems, and Alfred turned to the forge, foundry and office side, so that between them they made an excellent working partnership. The work was departmentalized, and foremen and heads of departments spread responsibilities more widely among the workers. With about 2,000 employees, some social problems soon became pressing. More houses of a better type were built for the workers, and to keep up with the building programme a new brickyard was opened up on the Pool Hill estate.

FRANCIS DARBY

Art Work

At Coalbrookedale, a long period of depression was ending in the 1830's, and Francis Darby now extended the Company's activities on what had been for nearly a century a minor line of production. As early as 1731 a large consignment of pallisades, pillars, rails, scrolls and spears had been cast for Preston Hospital, and the interest in railings and other architectural cast-iron work had continued in a quiet way, which made it easy for Francis to expand to the heights of the Hyde Park Gates and the Vienna Exhibition Gates. Francis, with his great love of art, expanded the foundries in another branch, that of casting figures and sculptures, and introduced good artists, some from France, to improve the designing section. In 1849 the Company was awarded the Gold Medal of the

Part of the new musei
Coalbrookdale Works, ill
ing various aspects of th
tradition of ironmaking
Dale.

Society of Arts for their castings, and approached the Great Exhibition of 1851 with considerable enthusiasm, and a very varied group of exhibits. The great fountain "Boy and Swan," designed by John Bell, stood near the gates now generally known, from their position, as the Hyde Park Gates. The fountain, after a chequered career among Wolverhampton parks, is now re-erected in the grounds of the Old Furnace at Coalbrookdale. The quality of much of the modelling of the art castings was very high, and a statue of Andromeda, cast in iron from the design and model of John Bell, is now in the Coalbrookdale Museum. Apart from these large works, a great number of small objects were cast, many of them of beautiful design: small busts, plates, statuettes, and even pictures, such as the famous "Last Supper."

Inexhaustible Field of Application

Towards the mid-century there seemed to be an almost inexhaustible field for the application of cast-iron—railway stations, house balconies, bridges, staircases, fireplaces, even shop fronts were made up of cast members, and much furniture for house, office and garden was made. In the introduction to the Coalbrookdale exhibits, in the Great Exhibition catalogue, it is stated that the Company employed between three and four thousand men and boys at Coalbrookdale and Horsehay. The output was 2,000 tons a week, and the works were then the biggest ironworks in the world. While the art castings took the popular fancy, the Company was producing a great range of rolled bars and sections, structural members, beams and columns, lamp-posts, machinery, engines, pots, stoves and fireplaces, and in fact every kind of hardware that could be made in cast-iron, from chimney pots to grave stones. For the material shown at the Great Exhibition the Company were awarded a Council Medal. These Medals (only 170 were awarded as compared with 2,918 Prize

Medals) were for some " i
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application, either in mate
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originality combined witl
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receiving Council Medal
have been outstanding. T
much of the increase in f
work which Francis and
achieved, the great ware
built in 1790 at Coalbro
was brought into full us
the fine cast-iron clock
was added in 1843. This building is in itself of
lent design, and is noteworthy for its extensi
of cast-iron, both structurally in columns,
the graceful lintels and sills of doors and wi
and the window frames, all in cast-iron.

THE NORRIS ERA

In 1849 Abraham IV and Alfred I had non
retired from the works and removed from th
and Alfred died in 1852. Francis died in 1
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of an era. The chief designer, Charles Cr
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casting sections so ably started by Francis
1866 William G. Norris was in a position t
over the management of all departments
works. Norris was brought up in the Dal
was of a Quaker family which had long c
tions with the district, his father being at the
before him. Under his management, while
casting continued by the momentum and rep
it had gained under Francis Darby and C
Crookes, other sides of the Company's activit
remodelled or extended. Conditions were n
happy at Horsehay, where the quality of the
iron had been allowed to deteriorate. Foreig
were brought in to be mixed with the local
and the furnace regulation was overhauled
the highest quality of iron production was re

Stoves and Fireplaces

A section of the works which expanded
the second half of the century was that d
to the design and manufacture of stoves an
places. On the ornamental side, Mauri
Adams and Alfred Stevens were brought
designers and they produced many varie

ɔrate groups—fireplace, fender and overmantel scribed in the catalogues as *en suite*, including ;ns in the style of the Adam Brothers and pendale as well as Gothic and Classical. ıgh a great many of their designs are over- ɔrate and quite out of today's taste, they were popular at that time.

Engineering Section Extended

ıe engineering section rapidly extended, and a large variety of steam engines and ıinery, including the machines and rolls for the ;s both in the Dale and at Horsehay. The ıe shop was well fitted with large machine , among them some of the best of the time, h were capable of the heaviest work; a lathe a 20-ft. dia. face-plate, and a planing machine ıke 20 ft. by 8 ft., were matched by drills, 's, presses and other machines on the same . In about 1830 the Company had begun to ıop high-pressure pumping engines, though this was no new venture, for pump barrels had cast from the time of Abraham I. Some very installations were made both for mines and ıse in canal and harbour work. An important ıtion was the Parker and Weston Patent Pump, hich the Company was the sole maker. Parker a moulder, and Weston a machinist in the s. The former was also an inventor and later ded his own firm.

Other Developments

ıere was an early interest in electrical work, in the art-casting department the Company electro-deposition of bronze and copper ıes on a large scale. The Elwell and Parker ıt High-Speed engine, running at 500 r.p.m., built in great numbers, and along with genera- for which most of the castings were made at brookdale, were used to engine the earliest ric-power generating stations, as well as for l industrial and private plants. Tank loco- ves for collieries, ironworks, ractors' plants and works' ting, continued the Com- 's long standing interest in steam locomotive. In the dries small utility castings held an important place in uction—pots, frying pans a hundred other smallware les for the ironmonger were e, along with a rapidly in- ıing range of rainwater and goods—gutters, fall pipes, ı and water-pipes, gratings, About 1886 the Coalbrook- Company leased and later the Horsehay works to the ɔson family, who consider- extended the bridge and engineering side. To-day the Horsehay Company is still making bridges and specializing in the large cranes used in modern steelworks.

Change of Name

In the middle of this expansion, the Company was registered as The Coalbrookdale Company, Limited, its present name. The Company prospered, and at the beginning of the new century employed about 1,100 men in the Dale works. In 1901, to meet new demands, the Severn Foundry was built on the river bank at Dale End and for five years, amongst other work, it developed and produced a group of pioneer gas-cookers, many thousands of which were used by the London County Council in their housing schemes. Rainwater goods, large cooking ranges for hotels and canteens, and furnace and sugar pans for export and architectural castings were also made. This foundry continued to operate until early in 1917, when it was closed down due to the loss of manpower to HM Forces in the 1914-1918 war.

Lower Furnace Pool Filled in

In 1903, to allow a further extension of the Dale works the Lower Furnace Pool was filled in. All trace of the Lower Furnace of 1715 had gone during the expansion of the engine shops, and now many of the landmarks of the old works in the middle and lower Dale disappeared. The Old Furnace in the upper Dale was buried among and under a mass of moulding-patternmakers' and smiths' shops, but fortunately was left intact and to some extent protected by them. These numerous moulding shops in the Upper Works were only closed in 1930, when the Upper Forge Pool was filled in and new moulding shops of a very modern design were built over the site. W. G. Norris handed over the works to Duncan Sinclair in 1897, but remained in the directorate until about 1910. From 1904 to 1906 B. S. Brockbank was manager, and was followed by W. S. Malcolm who remained until 1929, although

castings on show in the museum.

Coalbrookdale 1709 *to* 1959

Alfred Darby II was chairman of the Company from 1886 to 1925, and his retirement marked the end of the Darby connection with the Works.

1914 TO 1928

With the outbreak of war the course of normal work was diverted. The production of gates and railings terminated in 1915, and the engineering department was leased to The Liverpool Refrigeration Company, who retained it until 1929. Aerial bombs, hand grenades, gun-carriage brake-blocks and many types of light-engineering castings were the principal manufactures during the war years, but on the cessation of hostilities the Company turned its attention to the development of the "Servall" Oven-over-fire Combination Grate, over 100,000 of which were produced, a large proportion of these being taken by the London County Council. In 1922, many companies were feeling the strain of world conditions and "nationalization" was the new watchword for industry. The Coalbrookdale Company responded by forming, with the Planet Foundry Company, Limited, Guide Bridge, Manchester, M. Cockburn & Company, Limited, and McDowall Steven & Company, Limited, both of Falkirk, an allied group under the title of Light Castings, Limited. The four constituent companies continued to produce their own specialities but shared matters of major policy and sales organization. The years 1923 to 1928 were a period of active development of all the lower works area in Coalbrookdale, with a great increase in the output of rainwater goods and the mechanization of garden-roller production. The brickyards were active at Shutfield and Lightmoor, and clay was still mined at Cherry Tree Hill, although bricks were not made there after 1905. The Company made all the firebrick shapes for their solid-fuel appliances, and for outside sale produced firebrick goods and roofing tiles, making as many as 125,000 tiles a week as their contribution to the local authority housing schemes.

NEW PARTNERSHIP

In 1929 The Coalbrookdale Company became a subsidiary of Allied Ironfounders, Limited, but like all the other constituent companies on its working side it retained its autonomy and its peculiar character. In 1930 a great remodelling was undertaken, starting with the closing down of the Upper Works moulding shops and the filling in of the Upper Forge Pool. A central gas-plant with electric generators, which was started in 1906, was closed down and the whole works turned over to a public electricity supply. Coalbrookdale added to its long list of "firsts" by designing and installing the first completely-mechanical moulding and sand-conditioning plant in the country, on which a large variety of castings could be produced with a greatly increased output. The engineering department was taken back from Liverpool Refrigeration Company, Limited, and became a plant maintenance and production unit for Allied Ironfounders, making and maintaining the patterns for the Ketley Pipe Plant. In 1938 the road down Coalbrookdale was improved at the Upper Forge, and in the alteration of its line a direct link with Abraham Darby I was severed.

WORLD WAR II AND AFTER

The war of 1939-45 again imposed new tasks on Coalbrookdale, and in spite of its older Quaker tradition the Company had to take up the production of bombs and other war materials. However, with the end of hostilities, thoughts and energies were directed to the problems of peace, and in 1944 the Company was able to produce a series of solid-fuel appliances, including the "Post-war Cookers" of revolutionary design. The enormous development of this type of appliance in recent years is another example of the many pioneering discoveries and designs made in Coalbrookdale. Further work on the cookers produced the "Rayburn," of which more than 150,000 have been made at Coalbrookdale at rates varying between 300 and 500 a week. A mechanized moulding plant was designed and installed for the production of the large castings required for the "Rayburn" Cooker, and this came into operation in 1947 as part of the No. 2 Mechanical Plant. In the post-war housing and rehousing programmes Coalbrookdale have played a large part, producing about 10 per cent. of the country's solid-fuel appliances for domestic use

Abraham Darby Celebrations

Sir Frederick Scopes and his committee who organized the three-day celebration of the 250th anniversary of the use of coke in the smelting and remelting of iron deserve warm congratulations on the outstanding success of their efforts. At the imposing banquet, there were gathered together, in not vastly different proportions, the important personages of the foundry, iron and steel, and coke industries, probably for the first time since their technical "divorce" some 50 years ago.

The opening lecture by Professor T. S. Ashton was fascinating as it revealed the background to Darby's invention and industrial development of the period, which in fact precluded large-scale enterprise, being dependent largely upon water power and sketchy inland, land and water transport. Dudley's claim to have used coke was discounted by the fact that the type of coal specified was not of the coking variety. Darby had the ill luck to start up his furnace during the worst winter in this country's recorded history, when frost lasted until June! The lectures given on the second day of the celebrations exhibited great erudition and also made outstanding contributions to the recording of UK industrial and economic history.

The final day was devoted to a whole-day visit to the Coalbrookdale indoor and outdoor museum, the Iron Bridge, an aqueduct and a skid for transferring barges from canal to river. Allied Ironfounders deserve the thanks of everybody interested in the history of founding, for they have erected and made available to the general public, for all time, a unique display. There is the old furnace (dating from 1709), in an excellent state of preservation, because it has been covered with debris for generations. The picturesque site is embellished by a Cupid-and-swan fountain, which was first erected in Hyde Park for the 1851 Exhibition. It was acquired by the Corporation of Wolverhampton and once adorned a local park, but was finally banished to the obscurity of a

Old-time truck and cast-iron rails, the first of which were made in 1767.

storeroom. As a gift from Wolverhampton, it has now found a final resting place in ideal surroundings. The entrance to the excavated site is through gates, recently cast and suitably inscribed to commemorate the opening and that of the works, 250 years ago.

The two rooms of the spacious museum combine in a superb way to disclose by exhibits, paintings and documents, the development of ironfounding and the history of the Darby family.

DINNER

The dinner held to celebrate the 250th year of coke in ironmaking was held at the Grand Hotel Birmingham on Thursday, September 24, and attracted an attendance of about 300. It was presided over by Sir Frederick Scopes and with him at the high table were the Rt. Hon. the Lord Mills, P.C., K.B.E., Minister of Power: Mr. C. R. Wheeler, C.B.E.: the Rt. Hon. the Lord Bridgeman, K.B.E., C.B., D.S.O., M.C., H.M. Lieutenant of the County of Salop; Mr. G. Savile Steven, managing director, Allied Ironfounders, Limited: the Lord Mayor and Lady Mayoress of Birmingham and Professor G. W. H. Lampe, vice-principal, University of Birmingham. Other prominent guests were Mr. Basil Darby and members of the Darby family; Mr. E. J. Leaver (Carron Company); Mr. G. W. Ilsley, the Master of the Worshipful Company of Founders, and Mr. A. H. A. Wynn (National Coal Board).

Copper Coalbrookdale tokens, made when there was a shortage of Mint coins. One of these tokens was presented to Lord Mills at the anniversary dinner.

Gas Porosity in Aluminium Alloys*

Ways of reducing porosity in aluminium-alloy castings are set out. Small voids in a casting often affect the tensile strength, wear resistance and pressure tightness. Much production time and money may be saved by attention to several basic rules of foundry practice.

Gas porosity in aluminium-alloy castings can be controlled. Hydrogen is the gas mainly involved, and the principal source of this gas is moisture. The foundryman should be aware of the sources of this gas, and the methods whereby its absorption may be avoided or minimized.

Causes and Cures

Steam from Combustion: Products of combustion in fuel-fired furnaces may generate water in the form of steam, necessitating proper firing techniques. Electric furnaces have the advantage of avoiding gas absorption by molten metal from this source.

Atmospheric Moisture: Atmospheric moisture varies from a fraction of a grain per cub. ft. of air, to 12 or 13 grains in hot, humid atmospheres. Extensive exposure of the melt may cause gas absorption.

Entrapped H_2 in Ingots: Hydrogen may be present in the metal. When alloy pig or ingot is cast, there may be some dissolved gas in the molten metal, precipitated during solidification and trapped in the form of pinholes. Such hydrogen is in the molecular form (H_2) and is not readily re-absorbed by the melt during remelting, generally escaping to the atmosphere when the alloy is melted.

Metal-surface Gases: The surface of ingot and scrap metal may hold gases which remain during remelting. Gases on aluminium surfaces occur in the form of physically-held absorbed films, activated chemisorbed films, and reaction of corrosion products. The first of these films is readily removed by heating, but the second, and even the volatile portions of the third, may be removed by prolonged heating at melting point. This latter form of gas absorption can be minimized by avoiding corrosion of the charge material. A short storage time, using a dry place, is recommended. Gas absorption from this source is also minimized by pre-heating the ingot and scrap, by adding them to the furnace on top of the charge as it melts down.

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* Abstracted from an article in *Aluminium News*.

Moisture on Metal Tools: The surfaces of cold metal tools such as skimmers and thermocouples may contain a small amount of moisture, especially if these tools have flux adhering to them. This may be avoided by preheating the tools before use. Preheating of metal tools in a gas or oil flame can, however, cause disadvantages, because condensation of moisture may be created by the flame on the cold tool.

Damp Refractory Materials: New furnace-linings and new crucibles should be heated slowly to a red heat, and held at this temperature for some time, before the metal charge is added. Moisture occurs within the refractory, so considerable time at a high temperature is required to remove this gas.

Hydrogen pick-up during Pouring: During the pour, when the oxide of the molten metal is broken, the absorption of hydrogen can be extremely rapid. Careful handling of the metal from the holding furnace to the pouring ladles, and from the ladles to the mould, is essential to avoid excessive gas absorption from the atmosphere.

Damp Moulds: Moulds also contain moisture, some of which is evolved during the pouring operation. Any excessive turbulence in the gating system and low sand permeability, which causes the gas, mainly steam, to penetrate the oxide surface and bubble into the melt, will accentuate gas absorption. Therefore it is important to control the moisture of the foundry sand, and to use sand having adequate permeability.

The following precautions will help to minimize gas absorption during and after the pour:

(*a*) Avoid excessive contact of the melt with the atmosphere; (*b*) hold the ladle as close as possible to the mould cavity to minimize the height of drop from the ladle; (*c*) pour rapidly from one container to the other down an inclined suface and minimize turbulence; (*d*) use a sand of controlled moisture content and adequate permeability to avoid the penetration of generated steam into the melt in the mould cavity, particularly in large sections, and (*e*) avoid excessive skimming.

Degassing by Fluxing

Degassing may be accomplished by introducing a gas or vapour, usually chlorine, nitrogen or volatile halide, into the bottom of the melt so that the bubbles rise upward. As the gas or vapour bubble is not saturated in respect of hydrogen, some of the hydrogen in the melt diffuses into the bubble and escapes as it is carried with it to the surface. Dry helium, argon or nitrogen may be used for this operation, but chlorine is most frequently used. It is essential that fluxing material be free from moisture. It is possible to de-gas by using dry, solid volatile halides containing grain-refining elements (such as certain compounds of titanium, boron, and zirconium) to produce a combination effect of grain-refinement and degassing.

Solidification and Remelting

Gas in a melt that solidifies in a crucible is either evolved from the melt surface, or trapped in the metal to form pinholes. Such entrapped gas will then be in the form of molecular hydrogen (H_2), and will not be readily re-absorbed during remelting. Although this procedure is less efficient, it will tend to minimize the absorption of gas derived from the surface of the charge material, although none of the other sources of gas are eliminated by this technique.

South Wales Ports Trade

Once again improved imports have tipped the scales in favour of trade through South Wales ports compared with a year ago. For the four weeks ended September 6, the total trade was 1,249,524 tons, compared with 1,206,975 tons in the corresponding period last year. Imports, at 773,017 tons, were 55,000 tons up on last year: exports, at 476,507 tons, were about 12,000 tons down.

So far this year total trade of the ports has amounted to 11,387,152 tons, 203,713 tons less than the comparable 1958 figure. Imports have been up—7,196,471 (6,717,302) tons. Iron ore, at 2,750,983 tons, was 281,523 tons above the 1958 level and non-ferrous ores have risen by 9,667 tons to 171,962 tons. Imports of iron and steel goods fell by 131,601 tons to 104,176 tons.

The biggest decline in exports—4,190,681 (4,873,563) tons—has again been in coal, coke, and patent fuel. Foreign shipments have dropped from 1,129,843 tons to 765,606 tons. Shipments of tinplate, however, have showed an improvement of no less than 65,560 tons to 317,816 tons and iron and steel manufactures were up by 109,525 tons to 368,911 tons.

The 1959 tonnages through the seven ports (1958 figures in parentheses) for the year to September 6 are as follow:—Newport, 1,559,751 (1,766,687) tons; Cardiff, 1,553,324 (1,370,151) tons; Barry, 887,624 (1,231,659) tons; Port Talbot, 1,896927 (1,640,597) tons; Swansea, 5,189,429 (5,248,946) tons; Penarth, 282,600 (304,461) tons; Lydney, 17,497 (28,364) tons.

Non-sparking Safety Tools. In a 16-page brochure neatly illustrated with line drawings, Charles Carr, Limited, Grove Lane, Smethwick, 40, Birmingham, have described and priced a wide range of hand tools, made from aluminium-bronze, which exhaustive tests have shown to be completely non-sparking in use.

ISI Translations

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available from the Iron & Steel Institute
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Operating conditions of converter and their
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Department of Scientific and Industrial
20, Chester Terrace, London, W.1. HB:
ıtcher, P.O. Box 157, Altadena, California,

Sales

ırd of Trade has instructed its agents,
gsten, Limited, to resume sales of a limited
tungsten ores as market conditions permit.
e made gradually in the United Kingdom
so as to avoid disturbance of the market.
have been made from the board's stocks
1957, in view of the weakness of the
lowever, prices have risen sharply in the
eeks, and now stand at about 167s. a unit.
states that no fixed period has been set for
l, nor has any specific quantity been set
his purpose.

High-temperature Equipment Exhibitions

Morgan Crucible Company, Limited, Wandsworth Works, Point Pleasant, London, S.W.18, is co-operating with the Merseyside and North Wales Electricity Board and the North Western Electricity Board in giving practical demonstrations of electricity as a heat-source for industry. Two exhibitions have been arranged, the first of which is to be held at the Industrial Development Centre, Paradise Street, Liverpool, from October 12 to 20, and the second at the Main Electricity Board show-rooms, Town Hall Extension, Manchester, from October 26 to 30; both exhibitions will be open from 9.30 a.m. to 5.30 p.m. daily.

A number of high-temperature furnaces illustrating the versatility of Morgan's Crusilite furnace-heating elements will be operating at temperature throughout the exhibitions. The complete range of elements now available, associated refractory materials, as well as experimental mock-up furnaces will also be displayed. Technical staff will be in attendance for discussion on any aspect of heat-treatment in which Crusilite may be of value.

Industry's Capital Spending

Company forecasts of capital expenditure made at the end of 1958 proved too pessimistic, according to Board of Trade estimates published on September 18. Industry is likely to spend a little more on capital equipment this year than last, but next year the amount will probably be slightly less. Manufacturing companies will spend about 10 per cent. less this year and there may be a further drop of 5 per cent. next year. The decline will be entirely in plant, machinery, and vehicles, which may drop by 10 per cent., and rather more money is likely to be spent on building work than in 1959.

Industry's capital spending in the second quarter was about the same as in the second quarter of 1958, but the proportions showed a big variation. Manufacturing industry spent about 10 per cent. less, while other industries and services spent 14 per cent. more. Within manufacturing industry, 13 per cent. less was spent on building work and 12 per cent. less on plant and machinery, while 15 per cent. more was spent on vehicles.

Birmingham Re-development Schemes

The first of a new series of special surveys into the problems of West Midland market towns seeking new industry from the Birmingham overspill, was initiated on September 21, when 12 members of the Birmingham area committee of the National Union of Manufacturers, led by Mr. F. C. Shelley, acting chairman of the committee, paid a one-day visit to Ludlow. Here discussions were held with members of Ludlow Town Council, the chairman of Ludlow Chamber of Commerce, Mr. C. E. Judd, Mr. A. J. Hall of the West Midland Industrial Development Associations, and representatives of schools. Other places to be visited are Worcester and Wem in Shropshire.

The reports made by the committee are to be sent to the information library of the NUM in Birmingham, where they will be available for manufacturers seeking data about transfers which may become necessary under the Birmingham redevelopment schemes.

Equipment & Supplies

Core Oil

F. & M. Supplies, Limited, 4 Broad Street Place, London, E.C.2, showed for the first time at the recent Foundry Exhibition in Bingley Hall, Birmingham, a new core oil, designated Supinol RB.314. It is claimed that its development is the result of research into new methods of formulating and compounding core binders, involving: the study of developments in foundry practice over the past 15 years, and the economics of coremaking from the foundryman's point of view; scientific re-evaluation of the conventional raw materials used in the manufacture of core oils and other binders, and a search for new raw materials.

Steep Dry-strength Curve

The important feature stressed for the new oil is the fact that the major part of its dry strength is due to polymerization, which occurs very rapidly at the baking temperature, and not, as is usually the case with conventional oils, to a gradual rise in strength due to oxidation. In practice this means that, using the new material, the bond is formed as soon as the core reaches baking temperature and, expressed graphically, the dry-strength curve is very steep. Typical cores produced are illustrated in Fig. 1. The danger of overbaking has been overcome by blending oxidizing oils into the finished product. The greatest benefit will be gained from using the new core-oil when one or more of the following conditions apply: cores have to be baked quickly; cores have to be baked uniformly throughout; reduction in gas evolution is essential, and dry permeability is called for.

Low Specific Gravity

Supinol has a lower specific gravity than raw linseed oil, and therefore makes more gallons per ton, a fact that should be taken into consideration when comparing prices. It also has a very low viscosity, which ensures easy measuring by volume and excellent mixing with any type of sand—it is easily emulsified with any foundry cereal and water. When using it, any normal core-sand mixer is suitable—sand may be either wet or dry. The recommended percentage of oil to be used is 0.5-1.5 per cent. Any normal batch or continuous stove is suitable when baking—the temperature range should be 350 to 500 deg. F.

Advantages

Advantages claimed for Supinol are: baking time reduced by 30 to 50 per cent.; stoving capacity increased; fuel costs reduced; higher dry strength than linseed oil at shorter baking cycles; easy mixing in sand mill; good skin finish to cores; economical i gallons per ton; excellent stripping prop corebox; less gas evolved on pouring; life of core sand; cores uniformly bake fumes on casting.

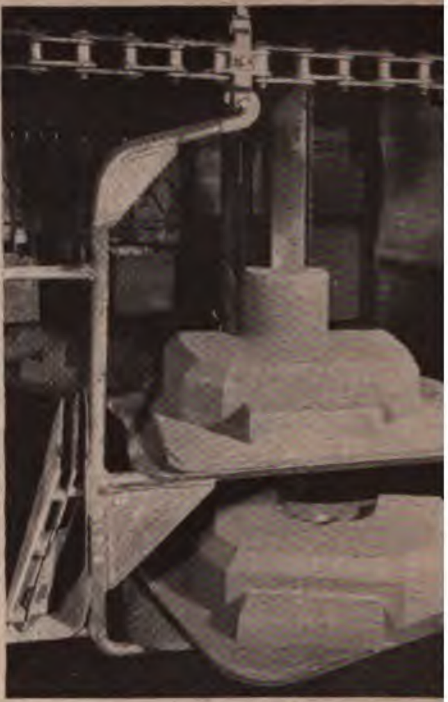

FIG. 1.—*Examples of medium-size m produced with a rapid-drying corebi duced by F. & M. Supplies, Limited, of*

Maintenance Scheme

Wolf Electric Tools, Limited, Hanger La W.5, have introduced a maintenance serv benefit of all users of their equipment in C and Ireland. Under this scheme a mainten contract is offered (covering two, three or hauls per year) which includes dismantlin thorough mechanical trical overhaul, lubr newal of carbon b skimming of comm necessary.

Heavy-duty Tractor

David Brown Equipment, Limited, Park, Feltham, Mid marketing a heavy-du tractor (model 900). tration (left) one of tors (which is also e shunting rolling stoc used, at the Birkenhe Manganese Bronze Company, Limited, to ton ship's propeller foundry to the mach

Section devoted to the technology of producing
DIMENSIONALLY
ACCURATE
CASTINGS

Investment Castings .... some Aspects of their Costs*

By W. S. Fowkes

Development of the investment-casting industry, and the impetus given to its expansion by the needs of the aero industry is first dealt with. Then, the present position is considered and the need for rapid expansion emphasized. The article concludes with a description of a costing system, the adoption of which the Author regards as essential if the industry is to make progress on sound basic economic lines.

DEVELOPMENT OF INVESTMENT CASTING

establishment and early expansion in the of investment casting in this country was dictated by the requirements of the aero y, upon the successful development and iction of gas-turbine-powered aircraft. Here ready-made market for the products of init foundries and, although in most cases the gine manufacturers themselves installed init-casting facilities, requirements soon outl output capacity, with the result that the dustry began to seek assistance from outirces. This help was forthcoming from the dent investment caster who, having already the industrial potential of the process, had created facilities for investment casting.

Three Types of Firm

equel to these events was the emergence of stinct categories of operating firm:

he tied foundry of the aero-engine manu-
.
he tied foundry of the independent organi--in many cases the parent firm being al-ell established in the field of steel and/or ional founding—where the operation of process could be considered as merely an n of normal manufacturing activities.
ıe independent investment caster, where the ıf the Company resources was devoted to nufacture of investment castings.

section of the independent investment-castıstry comprising foundries in categories (2) , engaged in the manufacture of jet-engine parts, enjoyed extremely favourable marketing conditions, as the need for a high level of output often overshadowed selling-price negotiations (upon which the aero industry would normally have insisted). Again, certain castings (stator blading, for example) cast in high-temperature alloys could not be made satisfactorily on a production basis by other methods of manufacture.

Unjustifiably-high Prices

The demand for investment castings during this period and into the early 1950's greatly exceeded the supply, the position being further aggravated by heavy and increasing national defence requirements. The customer (in this case the aero industry) called upon its outside castings suppliers for unlimited production and, as so often happens in such circumstances, with an almost complete disregard of the prices that it would have to pay for the castings. Thus, as was to be expected, unjustifiably high prices were paid in many instances. This was partly due to inefficient production giving rise to a very poor "saleable output: total production" ratio, in respect of which the extenuating circumstance of a too-rapidly expanding industry in relation to the acquisition of technical knowledge may reasonably be claimed, but also due in considerable measure to unrealistic costing procedures employed by some firms.

Recent Decline in Demand

As is well known, this so-called ready-made market is rapidly contracting, due to the advent of ballistic missiles, rockets and the like, and there are no signs of the development of an equally large and advantageous outlet for investment castings. Strenuous efforts must be made, therefore, by those investment casters who have to a lesser or greater extent served the aero industry, to compete successfully from both quality and price

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ther instalment of the series of papers presented during nual conference of the British Investment Casters' Technical ı (held at Connaught Rooms, London, on May 11 and 12). r is on the staff of H. & F. Precise Castings (1959), Limited.

aspects) with conventional methods of manufacture and, possibly also of great significance, with other types of close-tolerance casting. Those foundries which have not been involved in the aero-engine business, and which have employed the process solely on commercial as distinct from aero work, will have to contend with additional competition from those lately engaged in producing aero castings.

PRESENT POSITION

Rapid Expansion is Necessary

Having briefly examined the build-up of investment casting, and the impetus given to its expansion by the needs of the aero industry, and having observed the recent rapid decline in that industry's requirements, the answer to the question as to the future of investment casting in this country must be sought. As already pointed out, the aero industry offers no solution; indeed, with the almost urgent necessity for that industry to broaden the scope of its own manufacturing activities, added competition in the commercial field may well have to be met from the tied foundries of the aero-engine manufacturers themselves. The only answer lies in the rapid expansion of work from other industrial and commercial sources.

Break-through must be achieved

Generally speaking, apart from the aero-engine manufacturers' own foundries (and perhaps a few other exceptions), the investment-casting industry is, by nature, almost wholly sub-contracting. Its survival depends, therefore, on its ability to sell its products in the face of competition from sources manufacturing by alternative or more conventional methods. In many cases, these other sources have been supplying the same industrial and commercial users for many years, and have established traditional markets. It is in these markets that investment castings must achieve a break-through, by employing such factors as:

(a) Improved design of components—for example, integrally-cast parts to displace fabricated and welded assemblies.

(b) Casting parts as near to finished sizes as possible to reduce or, in some cases, to eliminate, expensive machining operations—to replace parts which have formerly been machined from bar stock or from forgings.

(c) Planned collective publicity, which in the opinion of the author would go far in persuading those responsible for the design and functioning requirements of components to at least investigate the merits of investment castings.

(d) Fair selling prices based on real costs.

The tasks of convincing designers and engineers of the great advantages that investment castings possess over parts manufactured by other methods, and of carrying out the progressive development of process techniques, lie in the hands of technical sales and publicity department staffs, works chemists and metallurgists. Notwithstanding any success that may attend their efforts, unless a sound costing and estimating policy is maintained, failure to gain these markets is assured.

Initial Successes

Fortunately, there is evidence that considerable success in "selling the process" to designers and engineers is being achieved, and as this expansion in knowledge of the process and its products manifests itself over the whole range of components suitable for manufacture by investment casting, so will the good intentions of the industry as a whole be put on trial by the markets it seeks to serve. However, should those markets find cause to suspect the industry of indulging in sharp practices, then the investment-casting industry will not mature, nor find a permanent place in the pattern of the country's industrial make-up, despite its attaining an abundance of scientific and technical accomplishments.

"Sharp Practices"

Sharp practices may be exemplified by the following typical case in point, and have been knowingly employed despite their damaging effect on the industry from the long-term viewpoint.

Over-charging

A part which had formerly been manufactured satisfactorily by conventional methods became the subject of an enquiry for production as an investment casting. The part was eminently suitable for production as an investment casting, from both design and alloy castability aspects, and the estimates showed that it could be sold at about 50 per cent. of the price then being presently paid by the enquirer for the conventionally-produced part. The investment caster realized this, but nevertheless entered his quotation for the part at a price far higher than the one he had calculated as the economic selling price, although marginally less than that being paid for the conventionally-produced part (sufficiently less to induce the enquirer to place an order for castings).

Price-cutting

Another example of sharp practice, observed during the general industrial recession which has been experienced in recent months, is the employment of the price-cutting device. This entails castings being offered at below manufacturing-cost prices (in some cases less than the cost of raw materials and labour without any addition whatever for overheads), simply for the purpose of keeping the foundry operating at a certain level of production, regardless of selling castings at a loss. Usually, this type of action can be undertaken only by the tied foundry of the larger organization, in view of the subsidizing which is required by the pursuance of such a policy.

Sooner or later such practices can only bring the industry into disrepute, and should be shunned by every investment caster as being contrary in all respects to the best interests of the industry. Selling prices must be kept strictly in relation to factual costs if the industry is to obtain the high status in the manufacturing world which it desires.

s must share Responsibility

raw materials to the industry must responsibility for creating and ex- ıarkets for investment castings, in prices of their products should be ın costs of production, and undue aken of the fact that they are quite in a non-competitive market. Con- must be made by the investment- to reduce prime costs, and unless erate, by keeping prices of raw v as possible, they are creating an the expansion of investment cast- entually detrimental to the interest themselves.

ırate Costing is Essential

as been made in this paper to place stry a policy which, in the author's st adopt if it is to maintain and ent markets and attract new con- ded undesirable practices such as d are carefully avoided, and pro- und castings are produced by ls for sale at realistic prices to the re is no doubt that the industry t has been seen that a pre-requisite ful carrying out of the policy ability of the industry to accurately osts. Since nowadays, in almost firm prices have to be quoted buyer before orders are secured, that the system in operation permits timate of manufacturing costs in y production which may subse- ace. It might be said in this con- the independent, self-contained, ers have a distinct advantage over ries, in that an entirely suitable nstalled which, apart from disclosing proves them by enabling overall of cost accounts with financial l foundries do not always enjoy and it is quite common to find them st their products within the framework of a system which, although usually quite valid for machining, fitting and other manufacturing departments, is not in the least adequate for determining the costs of investment castings.

While it is not the author's wish to appear dogmatic regarding systems, nor to seek to impose specific costing procedures on the industry, and although it is acknowledged that there may be alternative methods of arriving at the desired results, it is nevertheless essential that certain basic principles be observed to ensure that true production costs are disclosed.

How much for a Saleable Casting?

Irrespective of the system employed, it must, for every part manufactured, provide the answer to the question, "How much does it cost to produce a saleable casting?" The operative word here is "saleable," since, as every investment caster knows so well, the burden of process scrap has to be supported by the good output. It is necessary, therefore, to be able to determine the cost of the scrap arising at each stage of production. This calls for a form of progressive process-costing system where each departmental cost account is charged with the cumulative cost of production to date, together with the production costs arising in the department concerned, the same account being credited upon the castings moving to the next stage of production. It is important that the number of parts represented by these cumulative costs be recorded in the account, to enable an equal share of the cost of scrap to be borne by each good part produced. In this manner the cost of scrap becomes an addition to the cost of a good part forwarded to the next stage of production.

TYPICAL COSTING SYSTEM

A typical departmental cost account for, say, three separate parts (simplified to illustrate the point) would be as shown in Table 1. From this example will be seen the object in establishing the true cost of scrap or wastage at the stage where it occurs. It will be observed that opening and closing "work in progress" quantities

TABLE 1.—*Example of a Typical Departmental Process Account.*

Product A.		Product B.		Product C.		—	Product A.		Product B.		Product C.	
ty.	£	Qty.	£	Qty.	£		Qty.	£	Qty.	£	Qty.	£
08	1,439.3969	675	974.9219	2,206	3,489.9815	Scrapped during the period ..	*45*	*96.9492*	*4*	*8.1816*	*118*	*253.7145*
	49.3736 136.2250 66.6660 266.5515		38.3890 105.9177 51.8342 207.2492		119.4578 329.5919 161.2962 644.9125	Work in progress at end of period	71	161.1044	—	—	94	213.6267
08	1,958.2130	675	1,378.3120	2,206	4,745.2399							
74	157.4334	1	1.9547	87	184.9912	Transfers to next process department	866	1,954.5420	672	1,380.2667	2,081	4,716.6044
82	2,115.6464	676	1,380.2667	2,293	4,930.2311		982	2,115.6464	676	1,380.2667	2,293	4,930.2311

and their respective values are determined automatically, thus providing accurate and indispensable information for the preparation of financial accounts. It should also not be overlooked that this type of cost account contains information which provides valuable data on operating efficiency, pinpointing improvements or deteriorations in standards of work (and sometimes in materials) for the benefit of those responsible for process control.

Allocation of Charges

Having established that this type of system will, in principle, determine the stage-by-stage cost of each good casting produced, it must be decided how to allocate and charge the various items of costs, departmentally. As in most industries, investment-casting costs consist of direct and indirect expenses. Direct costs are incurred for materials used in the process, and for labour which is specifically allocable to the working of these direct materials. Indirect costs, or overheads, are those which by their nature cannot be allocated to individual products, and which require a basis for their distribution over the whole range of production. The allocation of materials does not present a very difficult problem as, generally, they are all special-purpose materials. Some recommendations, however, should be made as to their treatment. It is of the greatest importance that they should be charged direct to production wherever possible.

Sectionalized Stock Ledger

The stock ledger, or whichever form of stock control is operated, should be sectionalized under process departments (preferably in process sequence) thus allowing easy posting to the departmental cost accounts. Where materials are used in more than one department, the cost journal is the medium for transferring the amount involved from the stock-holding account to the using account. If well-designed, the stock ledger provides a wealth of information, including daily balances of stocks on hand, quantities outstanding against orders, and price movements—it also provides the means for reconciling "commencing stocks plus materials received" with "issues during the period plus remaining stocks."

Labour

The allocation of labour is also a relatively simple matter, and merely requires a suitably-designed form of payroll, along with accurate information from each department regarding quantities processed, and times taken to carry out operations where required for purposes of calculating bonus payments. Once again, the principle of charging direct to production should be strictly observed. For example, having decided the number of labourers necessary to sustain a production department at a given level of activity, there is no reason why their cost should not be charged direct to production.

Power

Since power, usually in the forms of gas and electricity, accounts for an appreciable proportion of the cost of an investment casting, it is quite proper to charge these items direct to production. Gas, it is suggested, should be charged on the basis of the number of moulds fired, and electricity on the number of melts poured.

Overheads

Having discussed materials, labour and power, and emphasized that as little as possible of these elements of costs should be left for recovery as overheads, overheads themselves and their recovery must be considered. Overheads may be divided into three main classes, variable, semi-variable and fixed, when expressed in relation to direct labour. Variables are those which fluctuate in the same ratio as direct labour, for example, works non-productive labour (when this is not allocable direct to production). Semi-variables fluctuate only to some extent with movements in direct labour, and are typified by such items as maintenance costs and certain insurances. Fixed overheads, as their name implies, remain unchangeable regardless of the level of production—examples of these are rent and rates, and advertising and publicity (if it has been decided to spend a specific sum for these purposes over a fixed period.)

Installing the System

In considering the setting up of a system along the lines indicated, an examination of past financial accounts should reveal the total overheads which had to be borne by the total saleable output over the period of those accounts. If a satisfactory level of producion had been maintained over that period, and the amounts charged to Profit and Loss Account as overheads were accurate, and provided the accounts showed a reasonable surplus, then at least an average operating efficiency would be implied, and the ability to compete for work successfully, proved. In this case, a definite relationship between the level of production activity and the overheads charged can be seen to exist.

Overhead/Direct-labour Ratio

It is generally acknowledged that spreading or allocating overheads to production may be effectively carried out by determining their relationship with the production factor common to all process departments, *i.e.*, direct labour, and by expressing total overheads as a percentage of total direct labour. Though recognizing that persistent efforts are continually being made to increase the mould yield value by improving designs and reducing process scrap, and that success in these endeavours will further reduce direct costs (thus affecting the overhead/direct-labour ratio), it is nevertheless necessary for the already determined overhead/direct-labour ratio to be utilized for the vital purpose of estimating production costs when enquiries for castings are received, and when quotations are required.

In the absence of a satisfactory trading period on which to establish a realistic overhead/direct-labour percentage, budgets to cover the ensuing financial period should be prepared by determining:

ipated level of production, expressed erms of mould output, taking into total manufacturing capacity avail- minimum economic utilization of rom this the total direct labour for period may be assessed. (2) The al overheads to be recovering during From this information the overhead/ percentage may be calculated, thus means for accurate estimating for nst enquiries. Frequent comparisons heads, budgets and financial accounts the accuracy or otherwise of the ereupon simple adjustments to the ect-labour percentage may be made if ariations in direct labour from the y also cause adjustments to be made.

dvantages of the System

ion of the type of progressive pro- system described, together with the tion of the principles recommended in e treatment of direct materials, direct er and overheads, will ensure the of factual historical costs in addition g a sound basis for estimating.

ortant advantages accruing from the stem are:—

led that historical cost accounts are fixed accounting periods of say, four re completed as soon as possible after tion of the accounting period, over- overy of overheads against the budgeted at once evident. Normally, if ases without additions to production tendency is for overheads to be over- pon the application of the pre- verhead/direct-labour percentage, whilst converse is also true, thus signifying s in overall costs of production. These in turn, provide up-to-date information ing the overhead/direct-labour percen- must be applied in future estimates

ost and quantity of process scrap are the stages where scrap arises, enabling to be made with allowances for scrap ates. Again, this is another source of mation to those responsible for the the process.

arging production directly wherever d by restricting the amount to be y way of overheads to the bare mini- ror inherent in all methods of overheads negated to a very great extent.

isable Departures from the System

s from a system such as that des- ich offers simple yet well-controlled curate costing and estimating, are often for invidious comparisons being made ain producer's manufacturing costs and sub-contractor.

surely, no justification for treating fixed proportion of the total overhead/direct-labour percentage and applying this ratio to each and every part produced by the process. Obviously, some castings, by nature of their design and the casting alloy employed, are more prone to scrap than others of less complexity made in alloys of better castability. Inspection standards may also vary considerably from part to part, depending on the quality specified by the customer, and this too can have a very marked effect on scrap rates. It cannot be too strongly emphasized that the cost of scrap should be "built-in" to the cost of a saleable casting, in the manner prescribed, and should not be treated as an overhead to be recovered at the same percentage rate of direct labour for every type of casting produced.

It is regrettable that these criticisms must be levelled chiefly at some of the larger organizations, who wrongly maintain that special-purpose costing systems cannot be introduced for one relatively small department. In cases where these units also employ the services of sub-contractors (who are often dependent entirely on the output of investment castings, and who are compelled to combine efficient production with a sound costing and estimating system in order to exist), comparisons of production costs are futile and should not be attempted.

It has been observed that a tendency exists in some of the larger concerns for certain labour which can quite validly be described as direct (and, therefore, chargeable direct to production, thus attracting a relative portion of overhead) is instead treated as indirect labour and becomes part of the overhead. Since the overhead addition to the cost of the directs is by a predetermined percentage on direct labour, it is evident that in some cases this particular form of labour is completely ignored when costs are being prepared—and again, if the independent sub-contractor is engaged in producing similar products he is inevitably once more the victim of nefarious price comparisons.

CONCLUSION

The purpose of compiling this paper has been to indicate the conditions necessary to attract and retain the confidence of the commercial engineering world in the industry's ability and intention to supply its products at fair and reasonable prices. With this object in view suggestions as to the treatment of the elements of costs have been made, and the broad lines of what is considered to be a sound policy laid down, a policy which must be followed if investment casting is to attain the status of an accepted and respected industry, and if it is not to be generally regarded as being comprised merely of a few individual organizations operating a freak process. It is to be hoped that those operators who are at present inclined to remain aloof in their attitude to the need for the general, commercial and technical advancement of the process will reconsider their position, and engage in the collective effort to secure a permanent future for investment casting, so that a great industry, having been born, may expand and prosper in its own right.

Introducing the Author. . .

Mr. W. S. Fowkes is general manager, and a director, of H. & F. Precise Castings, Limited. He was educated at Bemrose School, Derby, and subsequently received commercial training at Derby Technical College, specializing in accountancy, statistics and economics. Commencing employment with Rolls-Royce, Limited in 1935, he underwent comprehensive training in financial and cost accounting. He was promoted to the chief accountant's personal staff in August, 1939, and undertook special statistical duties and budgetary work until joining the Royal Signals in September, 1941, where he served until December 1942. He then rejoined Rolls-Royce as personal assistant to the chief accountant, and was mainly engaged on final accounts, statistical duties, methods and systems until leaving in January, 1946. The next six years were spent in the service of accountants in public practice, in order to gain a wider knowledge of company taxation. He returned to industrial accountancy in 1952 as financial and cost accountant for H. & F. Precise Castings, Limited, and was appointed company secretary in June, 1952, and general manager in December, 1955. Mr. Fowkes is a qualified company accountant, and was appointed to the board of directors of the firm in April, 1959.

Investment Castings—some Aspects of their Costs

DISCUSSION

The Chairman (Mr. R. W. N. Danielson, of Deritend Precision Castings, Limited), thanked Mr. Fowkes for presenting an interesting, and in certain cases, provocative paper, and then called on Mr. Humphreys to open the discussion.

Mr. W. J. Humphreys (Deritend Precision Castings, Limited), began by saying that it seemed to him that, if the principles outlined by Mr. Fowkes were applied at Deritend's, a large clerical staff would be necessary. For example, 200 to 300 jobs might be going through at any one time, which would entail 10 to 20 pages of foolscap at each stage, and at least a doubling of clerical staff. Furthermore, Mr. Fowkes referred, in the main, to past history, and it would be interesting to learn how he applied this to his estimating system. Mr. Humphreys' third point concerned the effects of variations in capacity utilization on the selling price. If the capacity utilization went up in one accounting period, and down in the next, one might quote uneconomic prices for orders which come in for the next period. Customers did not mind prices going down, but they did not like them to go up, which might well happen on repeat orders.

Mr. W. S. Fowkes replied that he had found it quite possible to carry out the work with a relatively small clerical staff, since he believed that most of the work was already being done, but in the wrong channels. Careful selection of the type of information was necessary—a large volume had to come from the shop floor, and if the people on the shop floor were made responsible for providing the information, then it would be forthcoming. Mr. Fowkes said that he did not regard this as a problem at all; his firm had a large number of jobs going through, but the ratio of clerical staff to production and other works staff was still relatively small. Much depended on the system used, and it was important to obtain the relevant information from the shop floor. As regards relating the past history to current and future estimating, Mr. Fowkes system was valid for setting up a system on these lines. For a given production, certain overheads had to be absorbed. If a firm had made a profit in the past, it followed that they had operated fairly successfully. They should know the total direct labour for a given production, and should base their prices accordingly. The employment or non-employment of available capacity was rather a difficult question, Mr. Fowkes continued. In investment casting, as compared with other industries, the saleable output or turnover was rather high, in terms of return on capital, in relation to the cost of capital equipment. Therefore, the problem was not as serious as in other industries. Employing the available facilities, one must aim at a level of production which would give a reasonable profit margin. It was not suggested that one should put up prices if one was under-employed at any one time. This practice was immoral, and became an impossibility when one was trying to compete with other people. If bad times were encountered, the industry should accept a lower margin of profit and secure additional work, to occupy plant at the level which gave the optimum return, by means of publicity and other devices.

(Continued in column 2)

Mr. Merson (Spartan Steel and Alloys) said that the ratio of overheads in metal in investment foundries was much higher than in conventional foundries, even though the latter were operating on a fluctuating market. The industry was mainly using alloy steels where there was no fluctuation, with a fixed price, and yet the ratio in the cost of metal was higher. In Mr. Merson's opinion, this was because of the relatively small quantities consumed. His experience had been that most investment foundries, even in their buying policy, would do nothing, or very little, to assist by bulk buying. Supposing a three-ton arc furnace was used to turn out metal. Obviously, if it was utilized to full capacity, the metal could be sold cheaper. Investment foundries would buy 10 cwt. or a ton, he said, but would never place an order for 10 tons for delivery as and when required, which order would enable a supplier to go ahead, make it up in bulk, lay it in stock, and charge or invoice after the metal was delivered. No attempt seemed to have been made, he continued, to standardize on specifications. It is surprising that, even within, say, an H.R. Crown Max spec., there were deviations between foundries, so it was a case of making up bits and pieces for one, and bits and pieces for another. This meeting had provided an opportunity to find out why there because such a situation could not exist where there was free competition throughout the world.

Replying, **Mr. Fowkes** said that perhaps they disagreed on the term. Investment casters were very loath to change their manufacturing procedures, because they were afraid of running into new forms of scrap, etc. Perhaps it was not a monopoly in intent, but it was certainly a monopoly in effect. It was true of several raw materials the founders used. Perhaps some time the industry would not be able to resist these low raw material prices, particularly if they were related to production costs.

Mr. D. H. Armitage (P. I. Castings (Altrincham), Limited) said that the industry was not just interested in making history, but also interested in what it cost. How long, he asked, after the end of an accounting period would Mr. Fowkes consider the publication of accounts satisfactory? Costing was just being wise after the event—the thing that mattered was estimating, and making sure that it was practised in the shop. When one prepared one's estimates did one go through the same form as if one were casting—did one say that one was going to get six wax patterns scrap, and six on coating, and at each stage build up one's scraps in one's estimating? Thirdly, he said, it was very easy to say that the man who charged more than oneself was guilty of sharp practice, and the man who charged less guilty of under-cutting. While investment-founding was only a small industry, there was much specialization, so that anyone inquiring the price of investment casting could get quite a wide price variation without either sharp practices or under-cutting arising.

Mr. Fowkes replied that, in spite of the great amount of work involved in presenting cost accounts, four weeks after the end of an accounting period was ample time in which to produce a complete set, reconciled to any financial results that might be available. His own firm operated in four-weekly accounting periods (thirteen in each year) and, after one had closed, they had four weeks in which to produce the cost accounts for the previous period. He continued that he was more concerned with estimating than with costing after the event—one only proved or disproved the other. His firm also took the trouble to compare their historical costs with their built-up estimates at various stages. One was bound to get variations, which one never estimated as scrap or process scrap, and that gave valuable data for future estimates. In the end it all helped to form the pattern of what could be expected from a certain job, the number that were going to be obtained in the mould, and so on. Also, with regard to the building up of experience, the castability of the alloy in question might be difficult. Regarding specialization, it could not be expected that all quotations should be within 3 per cent. of one another. Marginally, company A might be technically better at casting than company B—the process of company A might be more suitable for making small parts than large ones. Mr. Fowkes' firm had quoted recently 24s. for a part, and the order was placed at less than half. The reason was that it was not suitable for the firm's set-up. However, an estimate was prepared, qualified by a statement that, although they could make it, it was not really the firm's kettle of fish. In the course of time, things would fall into a pattern, and some companies would be more successful in obtaining orders for smaller parts, whereas others would specialize in larger parts.

Difficulty with Fettling Costs

Mr. I. L. Gwynn (P. I. Castings, Limited) said that he was in sympathy with Mr. Humphreys' comments on costs of costing. It seemed a very high price to pay to get the information by the method suggested, bearing in mind the relatively small size of the foundry with which Mr. Gwynn was associated. The costing at his firm was very simplified, he said. The wax pattern, mould production, fettling and inspection were taken as four distinct and separate departments, and costs estimated and allocated accordingly. Of these, the department which gave greatest difficulty in estimating and costing was the fettling section, but this was quite common in the foundry industry.

Mr. Fowkes replied that his firm, too, was troubled by this department—it was an expensive luxury. Fettling accounts formed a large proportion of the cost of an investment casting. The best approach to the reduction of fettling costs was to make castings as well as possible; the wax patterns being without distortion or flash if possible. While his firm did not want to supply castings which looked unsightly, they had to do their best to get away with it as much as they could. Surface finish was very important from the selling point-of-view, but was not always the criterion, and they had found agreement could be reached with the customer on the standard of finish and the amount of fettling necessary. As regards the hiding of scrap, it had been found possible to control the floor staff so that they could not hide it. There was as much floor control as possible, so that things did not get out of hand. This was a necessary evil.

Mr. Gwynn then asked how Mr. Fowkes obtained his scrap estimates beforehand.

Mr. Fowkes said that that was the responsibility of his technical staff, who did it step by step by means of what they called the engineering quotation. For example, there might possibly be a liability to some form of shrinkage, or they might expect a sinking here or there—they tried not to have to allow for bad cut-off, etc., and depended on shop floor control to avoid same. Fettlers generally were semi-skilled people, and his firm tried to restrict the operations any one man had to do. The fettlers were not given a wide variety of different jobs—if a man were cutting off, then he was cutting off, and if he were knocking flash off, he was knocking flash off, and that was that. His firm depended mainly on technical people to assess, by their own experience, the amount of scrap to be expected after casting.

OOD, M.A., A.I.M.

Discussion of the Conference Paper :

Investment-cast Alloys for High-temperature Service*

It is clear, from the comments and questions recorded, that investment founders are somewhat apprehensive that laboratory-developed alloys may be lacking in "castability"—for want of a better term—and that increasing necessity for vacuum casting of alloys might only add to the founders' difficulties. Corrosion-resistance, and blades for small industrial gas-turbines, were amongst other subjects discussed.

r Mr. Wood had presented his paper, en- "Some Investment-cast Alloys for High- rature Service," the session chairman (Mr. Tomkinson of D. Napier & Son, Limited), for the first contribution to the discussion.

R. TAYLOR (Firth-Vickers Stainless Steels, d), opened by saying many people, including f, were very grateful for this paper con- g, as it did, just the highlights of a vast field hnology and enabling production personnel p up to date with general developments.

one who had had his fair share of the h and frustration that were the lot of the ment caster, when it came to attempting to complex shapes in "temperamental" alloys, uld like to make two comments: (*i*) It could e too strongly emphasized that it was of or no avail for the research metallurgist to late an endless variety of alloy compositions search for ever-higher specific properties, d castings could not be made in this alloy, ii) in the research into, and development of, emperature investment-cast alloys, it was sible for the metallurgist to co-operate too y with the investment founder. He said this se much information about the high-tempera- ehaviour of an alloy which became evident foundry was difficult to put into words. xample, it was no coincidence that Mr. Wood oned that H. R. Crown max. and X40 alloys utstanding thermal-fatigue resistance, and that same two alloys were singled out as having bly the best "castability." The investment- ry technologist saw here in his mind's eye the ular virtue of such alloys that enabled him ake a good casting, although the geometry component might seem to "ask for trouble." xample showed the crudity and inadequacy ords; "thermal-shock or fatigue resistance," d castability" (and, one might also add, d weldability") were apparently unrelated and yet were in fact attempts to describe ume physical phenomena.

The Severest Test!

The severest test a jet-turbine blade-casting got throughout its life was, really, the one it suffered during the process of "being born," namely, cooling from the molten state to "knock-out" from the mould. If the alloy could stand up to that, there was hope for it. If it could not—without chronic tearing and shrinkage troubles—then it might as well be abandoned as useless for high-temperature service, at least from the thermal-shock and weldability aspects.

Similarly, if an alloy could cool from the molten state in an air-containing mould and yield excellent smooth surfaces, there was reason to believe that it would not fail in terms of oxidation resistance.

By observing the investment-cast results of making a variety of shapes and sizes in an experimental alloy, under varying production conditions, the high-temperature-materials' metallurgist could acquire a useful background of fundamental information (difficult to put into words, and not obtainable from the usual series of laboratory tests), but which would help to accelerate progress in the field.

Mr. Wood had made it clear that the iron-base alloys had been superseded by the cobalt-base alloys, and that nickel-base alloys appeared to have superseded cobalt-base alloys. Further, the carbide-phase type of matrix-stiffening was superseded or augmented by the Ti/Al type. The graphs of mechanical properties illustrated this, but it was to be regretted that the introduction of the Ti/Al-complex had seriously detracted from the excellent castability in air which was associated with similar alloys not containing elements with such high affinity for oxygen. He was referring to the severe scumming and oxide-film-entrapment troubles met with on air-casting the Nimocast type of alloy.

Vacuum-, or inert-gas-casting techniques might be, or have to be, the answer, but he was sure that all investment founders preferred alloys which did not need "molly-coddling," and would live in the hope that research had not yet completely exhausted the potentialities of the periodic table. Investigators might yet find a combination of elements which gave the same or better all-round properties, as well as good castability, without recourse to the

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er presented at the first annual conference of the British ent Casters' Technical Association and printed in the JOURNAL, 1959. The Author is associated with the Mond Nickel Company, —details of his career were given in the JOURNAL at the end aper.

exclusion of air from the melting and casting operations.

Effect of Inhibitors and Chlorides

MR. J. E. P. DOLL (Spartan Steel & Alloys, Limited), asked if Mr. Wood could give any information on the effect of modern inhibitors used in high-temperature boilers, steam turbines, etc., on investment-cast materials,

MR. D. R. WOOD could not answer in terms of the alloys mentioned in his paper, as few, if any, of these had been used for these applications.

MR. MEERKAMP VAN EMBDEN (Philips' Gloeilampenfabrienken, Holland), asked was there a difference in the resistance to chlorides in solution between iron-base, nickel-base and cobalt-base alloys.

MR. WOOD replied that there was no short answer to this question. The type of corrosion encountered, whether general or localized, depended upon the environment, *i.e.*, concentration, temperature and degree of aeration. Again, corrosion resistance was markedly affected by alloying. For many practical conditions, however, stainless-steels served well, whilst nickel/chromium alloys were strongly resistant to aerated chloride solutions.

Blades for Automobiles?

MR. I. L. GWYNN (P. I. Castings, Limited), referring to Mr. Beesley's comments on the previous evening, when it had been indicated that the aero-industry tended to lead what could be regarded as the general-engineering industry, asked if Mr. Wood could give members some indication of when the investment founder was likely to be called upon to produce turbine blades for the automobile industry.

MR. WOOD said he wished he knew! He thought the day of the mass-produced, small turbine was not so very far off. Its development was probably proceeding faster in the United States than in Europe and there were several designs of quite economical, small turbines available in the US which might appear in large numbers in a few years' time.

However, the application for them in Europe would appear to be less in the small passenger car than in machinery which required higher horse-power. The field in which the small gas-turbine looked like competing almost immediately with existing forms of engines was in the 200-h.p.-and-upwards class.

Apprehension about Vacuum Melting

MR. N. WALKER (Hadfields, Limited), reported that most investment casters were becoming increasingly apprehensive about the need for vacuum melting and inert-gas melting of high-temperature alloys. Were there any prospects of developing high-temperature alloys possessing the tolerance to permit normal commercial casting procedures?

MR. WOOD did not think it was impossible, and considered that perhaps a review in about two years' time would present a different position because research was taking place in this field both in the U.K. and in the United States. However, at the present time, no cobalt- or nickel-base alloys had appeared with the same excellent castability of X40 alloy, combined with improved strength and good ductility.

MR. L. S. TAYLOR (G. L. Willan, Limited), said his firm had had some experience with vacuum casting of high-temperature Nimonic-type alloys and it was reassuring that rejection rates—which were matters very close to the heart of the investment founder—were significantly lower, principally due to the elimination of oxide-film inclusions. If one had to use vacuum melting, involving additional capital outlay, at least one obtained something in return.

He asked Mr. Wood what would be an engineering acceptance level for ductility on the high-temperature alloys described in the paper. Figures of 3 per cent. had been mentioned as probably being unsatisfactory; what was a satisfactory level?

MR. WOOD replied that, in this matter, acceptable ductility appeared to vary with the type of application. Thus certain components, such as gas-turbine blades, had been made successfully from super-strength alloys having elongation values below 5 per cent. For other components, such as integrally-bladed rotors, however, in which very high thermal stresses were set up and persisted throughout the life of the component, about 5 per cent. was likely to be the lower tolerable limit. Ideal ductility was probably from about 6 to 10 per cent.; above that, a material was too ductile.

(This closed the discussion on Mr. Wood's Paper).

Conference Paper Author . . . .

MR. J. I. EVANS, whose contribution to the annual conference of the Investment Casters' Technical Association was printed in the September 3 issue of the JOURNAL, is attached to Monsanto Chemicals, Limited. He was educated at Pontypridd Grammar School from 1940 to 1946, and at University College of South Wales, Cardiff, from 1946 to 1950, where he gained a B.Sc. degree with Honours Chemistry, and completed the teachers' training course, receiving a teaching certificate and a diploma of education. His final year at university was spent at University College, Aberystwyth, where he carried out research under Professor C. W. Davies and gained an M.Sc. degree for a thesis on ion pair formation. From 1951 to 1954 he served as a flight lieutenant in the Education Branch of the Royal Air Force, instructing in elementary radio theory. On leaving the Forces in 1954 he joined the development division of Monsanto Chemicals, Limited, at Fulmer, Bucks, where products studied have included ethyl silicate, synthetic latices, P.F. resin adhesives and P.V.C. plasticizers.

News in Brief

PERIOD 1958-61, French steel output is
by 27 per cent., aluminium production
ent., and electrical power by 17 per cent.,
ch Government communiqué.

D PLASTIC DEVELOPMENTS (makers of
plastics shower cubicles) have taken over
ger premises at Old Town Wharf, Swan
orth, Middlesex; 'phone Isleworth 6319.

ranch office for the British Wagon Com-
ed, at 19, Ravendale Street, Scunthorpe,
hone: Scunthorpe 2860), opened on Sep-
nder the management of Mr. J. R. Farnell.

NDERS (GRIMSBY), LIMITED, of 12-14, Bath
sby, have joined the George Tucker group
s. As well as operating their non-ferrous
company are stockists of metals in rod,
eet.

E PAST FEW WEEKS, export orders placed
otors, Limited, Wolverhampton, totalled
500,000. These included one from Poland
heel tippers, and another was from the
Municipal Transport Department for
yce diesel-engined buses.

RST MEETING of the new High Authority
ean Coal and Steel Community lots were
termine members' length of office. Six-
will be held by the new president, Mr.
ice-president, Mr. Spierenburg, and the
n member, Dr. Potthoff.

IS TO HAVE its first smokeless zone on
Four hundred families live in the central
will be declared a smokeless zone this
the order for an extension of the zone
ne square mile of the city is expected to
by next March and come into force the
ctober.

of the Cutlers' Company from 1906 to
day is being written by Dr. L. du Garde
as revealed at the Forfeit Feast in the
l, Sheffield, on September 25, when there
ests present. The Master Cutler, Mr. J.
said the book would be published soon
ubscription.

AFETY TRAINING CENTRE for foremen and
e building industry—and the first to be
n the north of England—was opened on
25 at the Government Training Centre,
erpool. The opening ceremony was per-
Mr. T. W. McCullough, O.B.E., Chief
Factories.

F KEEN CANADIAN and European compe-
outh Durham Steel and Iron Company,
e been awarded a contract worth approxi-
0,000 (about £565,000) for the supply of
d sheet piling to British Columbia for the
work of the Port Mann bridge. Delivery
aterial must be completed by the end of

S AND SMALLEY, LIMITED, textile-machinery
tleton, near Rochdale, have secured a
rth £90,000 for the supply of textile
o Jugoslavia, Israel and Australia. The
to manufacture industrial and marine air-
and refrigeration equipment which will
k for about 500 extra men.

EMENT has been made between Batignolles-
d Blondel-Millspaugh for the rationalization of manufacture and sale of machinery for the paper industry in France and other countries. For this purpose a new company is to be formed with the co-operation of Millspaugh, Limited, Sheffield, and Escher Wyss, Ravensburg, West Germany.

SHEFFIELD UNIVERSITY METALLURGY DEPARTMENT has received a grant of £36,000 from the Government-sponsored Department of Scientific and Industrial Research for three new research instruments. They are a high-resolution electron microscope (£11,000), and X-ray scanning micro-analyser (£16,500), X-ray equipment for fluorescence analysis (£8,000) and auxiliary apparatus.

NEW CONVEYOR COMPANY, LIMITED, of Smethwick, has secured, in face of keen competition, a $1,000,000 (approx. £357,000) contract for seven-and-a-half miles of conveyor for a South American ore-handling plant. It is stated that one of the key factors in the winning of the contract was the short delivery date which the firm, a subsidiary of Tube Investments, Limited, was able to offer.

DEMONSTRATIONS of the uses and applications of nickel and nickel-alloys will be given at an exhibition to be held by the Mond Nickel Company, Limited, at Marlands Hall, Southampton, from October 27 to 30. The exhibition will be open daily from 10 a.m. to 7 p.m. (except Friday when it closes at 5.30 p.m.), and admission will be by ticket, free of charge on application to Dr. O. P. Einerl (hon. secretary, IBF Southampton section), c/o John I. Thornycroft & Company, Limited, Woolston, Southampton.

THE EXPORT CREDITS GUARANTEE DEPARTMENT announces that it is prepared, in appropriate cases, to insure capital goods business with Yugoslavia on terms of credit extending to five years from date of shipment. Hitherto for this market the limit has been three years from shipment. ECGD liability under this new cover will be 75 per cent. of loss for all risks covered. This relaxation is intended to enable UK manufacturers of capital equipment to continue to compete for business in Yugoslavia, now that the recent (February, 1959) UK Government loan is fully committed.

CHEMICAL CONSTRUCTION (G.B.), LIMITED, and Dorr Oliver, Limited, have recently commissioned a plant producing SO_2 gas for sulphuric-acid manufacture using by-product ferrous sulphate at the Grimsby works of British Titan Products Company, Limited. The plant which decomposes dried ferrous sulphate with coal in fluidized bed roasters, was designed and built by Chemico using Dorr Oliver Fluo solid reactors. The product SO_2 gas is converted to SO_3 for sulphuric-acid production and the residue is relatively pure iron oxide which can be readily used by the steel industry.

PRODUCTIVITY and the means of increasing Britain's industrial output during the next seven years was the theme of the Annual Conference of the British Junior Chamber of Commerce, which opened at Hull on September 25, and continued over the weekend. Nearly 60 centres in the country were represented. Amongst views put forward were increased co-partnership of employees, including that of administration, and the need to face the increase in the labour force due to the school-leaving " bulge," was also referred to. Delegates from Northamptonshire said that too much standardization would destroy the individualistic approach to business; they excluded, however, the larger industries of steel, ship production, aircraft and cars. The latter industries, they said, would probably derive more benefit from standardization since they were concerned with trading nation against nation, not against each other.

Film Review

Industrial Electric Heating. Available free on loan from the Electrical Development Association, 2, Savoy Hill, London, W.C.2, in both 16- and 35-mm.—sound and Eastmancolor running time 30 min.

A "film within a film," entitled "Industrial Electric Heating," was shown to representatives of industry and the Press in London last week. It deals quite extensively with the theory and practice of electric process heating of all kinds in most industries. The story opens with a film director being commissioned to make a film on industrial electric heating, a subject of which he is completely ignorant. He is shown making a first approach to Mr. Brewer, a manufacturer of electrical heating equipment, who agrees to help him. Brewer takes the director on a quick tour of his works, and a van standing in a nearby loading bay suggests a theme for the film. By showing some of the processes in the manufacture of the motor car, and its component parts, it is decided to illustrate the various methods of electrically heating different materials, in processes ranging from the preparation of raw materials to the painting of the finished product. The director accepts an invitation to join the firm's training class, to learn something about the basic electrical heating methods—arc-, induction-, dielectric-, and resistance-heating.

In a subsequent meeting, Brewer suggests other firms who could provide shots for the film and runs through several case histories which make the film director realize that there are few heating problems that electricity cannot solve, and where productivity cannot be improved. Other industries—ceramics—plastics—furniture—chemicals—in which electrical heating plays a notable part, are discussed and added to the director's notes. And so the film is made—not an exhaustive list of all possible applications of electrical heating methods, nor a detailed picture of any one process, but a brief survey of the advantages of applying electricity to various heating processes.

Produced for EDA by Verity Films, Limited, the film was, on the whole, very good indeed, with spectacular photography and first-class acting by the two principals.

Obituary

The death occurred on September 18 at the age of 73 of Mr. ALFRED BEEBE, formerly cashier with B. & S. Massey, Limited, Openshaw, Manchester. When he retired in 1954, Mr. Beebe had completed 54 years' service with the company.

Mr. JOHN ANDERSON, foreman brass moulder with the Carron Company, Falkirk, a position he had held for the past four years, has died at the age of 47. He served his apprenticeship as a brass moulder with Smith & Wellstood, Limited, Bonnybridge, and later worked in Ayr and Glasgow, returning to his home town to serve with Bonnymuir Foundry and Henry Russell & Company, Limited, Falkirk.

Mr. DOUGLAS S. GARDINER, a director and works manager of Glenfield & Kennedy, Limited, hydraulic engineers, etc., of Kilmarnock, has died at the age of 42. A son of Mr. Henry Gardiner, a former managing director of the company, he was chairman of the Kilmarnock district of the Engineering and Allied Employers' Association and represented the district on the general Council and management board of the Engineering and Allied Employers' National Federation.

Iron-ore Imports

Imports of iron ore and concentrates (except chrome iron ore and roasted iron pyrites) in August, and the totals for the first eight months of this year and last, are shown in the table below. The figures for 1959 are not completely comparable with those for 1958.

From	Month ended August 31.	Eight months ended August 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Sierra Leone	82.730	510.236	470.152
Canada	372.750	1.383.022	1.357,990
Other Commonwealth countries and Eire	7.566	2.397	17,166
Sweden	232.642	2.250.650	1.936,001
Norway	12.454	197.710	165.452
France	34.709	341.401	305,288
Portugal	20,767	92.580	147.001
Spain	49.981	447.342	348.279
Algeria	68,900	1.029.210	917.124
French West Africa	30,411	279.560	163,604
Tunisia	35,320	411.287	343,723
Morocco (excluding Tangier)	17,630	368.263	247,958
Liberia	23,090	196.219	236,663
Venezuela	149,677	1.059,434	829,619
Brazil	53.550	395.910	368.723
Other foreign countries	13.862	177,478	112,952
TOTAL	1,206,039	9,142.699	7,970,695

Board Changes

TUNGSTEN MANUFACTURING COMPANY (1958), LIMITED—Mr. R. A. P. Johnson has joined the board.

CAMMELL LAIRD & COMPANY, LIMITED—Admiral Sir Michael M. Denny has been appointed a director.

CONSOLIDATED ZINC CORPORATION, LIMITED—Mr. Maxwell I. Freeman has been appointed a director.

MIRRLEES WATSON COMPANY, LIMITED—Mr. James M. Lauder, secretary, has been appointed a director.

RENOLD CHAINS, LIMITED—Mr. W. V. Foley, who is going to Australia to become chairman of the company's subsidiaries there, has resigned from the board.

EVERED & COMPANY, LIMITED—Mr. C. H. Wilson has been appointed managing director, Mr. H. J. Bailey deputy managing director, and Mr. J. D. Hollingworth a special director.

DORSET IRON FOUNDRY COMPANY, LIMITED—Mr. William W. Brooks, previously general manager and technical director of M. & W. Glazebrook, Limited, has been appointed managing director.

BIRMID INDUSTRIES, LIMITED—Mr. W. N. Sherlock retired at the end of last month as a director and secretary of the company and a number of its subsidiaries after more than 40 years with the group. His successor as secretary of Birmid Industries is Mr. F. S. Taylor.

Mr. Ernest Parramore, chairman and managing director, F. Parramore and Sons (1924), Limited, ironfounders, Chapeltown, Sheffield, presented gold watches to three employees on the completion of 30 years with the firm on September 25. The recipients, all from the foundry section, two of whom started at the works straight from school, were Mr. ALBERT EVANS a foreman in the coreshops; Mr. ERNEST FOWEATHER and Mr. HARRY CLARKE, both moulders.

Personal

. C. Weaver has resigned from the board of
:man & Company, Limited.

. H. Cleaver, whose firm acts as secretary
mber of foundry employers' associations, has
ninated as a candidate for the Yardley division
ngham.

)avid B. Craig, of David Craig & Sons,
steel and ironfounders, Edmonstone Foundry,
l, Edinburgh, has been admitted to member-
the Edinburgh Merchant Company.

.. H. Thomas, who is manager of purchasing,
nd raw material control of British Belting &
, Limited, at Cleckheaton, has been elected
: of the Purchasing Officers' Association for

)hn E. Coleman, m.i.e.e., has relinquished his
hip and major share-holdings in Spesco
ments, Limited (makers of plastics for packag-
ainers), which will in future be controlled by
Chemical Industries, Limited.

'. Allan Charlesworth, b.sc., a director of
ol Processing, Limited, and managing director
'atent holding company for the process, Elec-
.imited, Poynton, Cheshire, is at present on a
the United States of America.

:. F. Choppen has been appointed a director
Petroleum Company, Limited. He joined
ıpany as a chemist in 1930 and became
of the co-ordination and economics depart-
1957, a position he has now relinquished.

:. W. Hardiman has been appointed general
(marketing) of the Esso Petroleum Company,
He succeeds Mr. W. H. Critchlow who
n appointed to the boards of Cleveland
n Company, and Esso Petroleum Company
.

y general manager of the David Brown
-tool and tool divisions, at Park Road Works,
ɔd, Huddersfield, Mr. A. Maugham, retired
ember 30 after 28 years with the company.
appointed to his present position in 1944 and
a local director in 1956.

ɔhn M. Brocklebank, who is a director of
Howson & Company, Limited, the Liverpool
irers and engineers, and a member of the
Docks and Harbour Board, is the new chair-
the Cunard Steam-Ship Company, Limited,
ıard White Star, Limited.

)avid N. Ward, of Sheffield, a sales repre-
for the English Electric Company, Limited,
North Western Electricity Board area, has
pointed domestic-appliance area manager in
ern Electricity Board area. He is succeeded
Vorth Western area by Mr. C. Wood.

mes Milne has been elected chairman of the
of the British Shipbuilding Research Asso-
n succession to Sir James McNeill. Col. T.
Smith, chairman and managing director of
Dock Company, Limited, Middlesbrough
has been elected vice-chairman in succession
ames Milne. The appointments are for two

.. R. Mortimer has been appointed south-
counties representative of Kelvin & Hughes
al), Limited. He succeeds Mr. A. R. Mewitt
now assistant technical sales manager. Mr.
:r has been a contracts engineer with Kelvin
for the past two-and-a-half years, before which he served in a similar capacity with Bailey Meters, Limited.

Mr. A. B. Skevington, Nottingham area manager of the electrical appliances division of Philips Electrical, Limited, is to take over the day-to-day running of the Nottingham branch due to the continued ill-health of the manager, Mr. N. R. Law. Mr. R. Seers, TV and radio division representative in the east Midlands, succeeds Mr. Skevington and is himself succeeded by Mr. E. W. Clarke, lighting division representative in Nottingham.

Dr. Norman Loveless, who is a lecturer in psychology at Queen's College, Dundee, has been appointed as a consultant to Smiths Aircraft Instruments, Limited. The growing application of experimental psychology to equipment design has from the first been closely associated with the problems of aircraft instrumentation, since it was recognized during the last war that the pilot's ability to respond quickly and accurately to information could be improved by scientific study of his capacities.

Mr. H. D. Macmurray and Mr. T. S. Ling, senior directors of George Scott & Son (London), Limited, of the Balfour group of companies, have left this country for overseas. Mr. Macmurray is making a world sales tour, which will include visits to the United States, Canada, New Zealand, India and Australia, and Mr. Ling will visit Canada and the United States for discussions with companies of the Balfour group in those countries. It is expected that both men will be away for approximately two months.

Mr. S. R. Howes, o.b.e., retired from the board of the United Steel Companies, Limited, on September 30. He was appointed a director in June, 1956, and assumed special responsibility for the company's then newly-created department of operational research and cybernetics. Mr. Howes was formerly a director and general manager of Samuel Fox & Company, Limited, a United Steel subsidiary. He remains managing director of Templeborough Rolling Mills, Limited, in which the company has a financial interest.

Hepworth & Grandage, Limited, of Bradford, announce the following senior staff changes: Mr. R. M. Waterhouse, who for the past four years has been assistant sales manager of the home market replacement division, has been appointed assistant export sales manager; Mr. W. G. Rogers, formerly assistant sales manager of the home market manufacturers' original equipment division, has assumed responsibility for both phases of home-market sales, under Mr. C. H. Mallinson, home sales manager.

The President of the Board of Trade has appointed Dr. F. Llewellyn Smith, m.sc., m.i.mech.e., and Mr. I. W. Macdonald m.a., c.a., to be part-time members of the National Research Development Corporation. Dr. Llewellyn Smith is managing director of the motor-car division of Rolls Royce, Limited, and a director of Bentley Motors (1931), Limited, Park Ward & Company, Limited, and Franco-Brittanic Autos, Limited. Mr. Macdonald is chairman of the National Commercial Bank of Scotland, Limited, and of Lloyds & Scottish Finance, Limited. He is also a director of the Scottish Mutual Assurance Society, and a member of the South of Scotland Electricity Board. Dr. Llewellyn Smith and Mr. Macdonald take the places of Sir John Duncanson and Sir Rowland Smith, who are leaving the Corporation on the expiry of their periods of appointment. Sir John Duncanson has been a member of the Corporation since its establishment in 1949; and Sir Rowland Smith has been a member since 1951.

Pig-iron and Steel Production

Statistical Summary of June Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in June. Table 3, weekly average production of finished steel in May. Table 4 gives the production of pig-iron and ferro-alloys in June, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index. 1938 = 100. Iron and steel.	Coal.	Basic materials excl. fuel[1]	Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy). Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[3]
1957	328	488	537	325	303	270	275	220	14	417	322	1,444
1958	343	503	478	276	262	227	245	196	9	369	254	1,542
1958—Nov. ..	341	509	476	289	237	210	234	187	5	352	281	1,563
Dec.[4]	341	509	473	269	230	206	223	166	4	314	239	1,547
1959—Apl. ..	342	504	476	299	219	201	231	211	5	357	297	1,459
May ..	342	487	478	292	236	203	240	211	8	385	285	1,457
June[4]	338	487	475	285	232	204	235	214	9	388	—	1 451

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in June, 1959.*

District.	Open-hearth. Acid.	Basic.	Bessemer.	Electric.	All other.	Total. Ingots.	Castings.	Total ingots and castings.
Derbys., Leics., Notts., Northants. and Essex ..	—	4.1	13.6 (basic)	1.9	0.1	18.3	1.4	19.7
Lancs. (excl. N.W. Coast), Denbighs., Flints. and Ches. .. Yorks. (excl. N.E. Coast and Sheffield) ..	0.9	35.0	—	4.7	0.2	39.5	1.3	40.8
Lincs. ..	—	43.3	—	—	0.1	43.3	0.1	43.4
North-East Coast ..	0.6	65.2	—	1.2	0.4	65.8	1.6	67.4
Scotland ..	1.5	31.6	—	2.3	0.1	33.7	1.8	35.5
Staffs., Shrops., Worcs. and Warwicks. ..	—	16.1	—	3.7	0.8	18.8	1.8	20.6
S. Wales and Monmouthshire ..	1.9	90.3	7.3 (basic)	0.8	0.1	100.0	0.4	100.4
Sheffield (incl. small quantity in Manchester) ..	8.5	34.2	—	12.1	0.3	53.4	1.7	55.1
North-West Coast ..	0.1	1.0	4.0 (acid)	0.5	—	5.5	0.1	5.6
Total ..	13.5	320.8	24.9	27.2	2.1	378.3	10.2	388.5[4]
May, 1959 ..	12.2	319.3	25.7	25.5	1.9	375.3	9.3	384.6
June, 1958 ..	16.0	308.8	24.5	21.9	2.4	362.7	10.9	373.6

TABLE 3.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1957.	1958.	1958. Apr.[4]	May.	1959. Apr.	May.
Non-alloy steel:						
Ingots, blooms, billets, and slabs[5] ..	5.0	4.6	5.1	4.8	6.0	5.1
Heavy rails ..	11.2	10.2	11.8	10.7	8.2	7.3
Sleepers ..	1.3	1.2	1.5	0.7	1.5	0.5
Fishplates and sole-plates ..	0.8	0.7	0.9	0.6	0.5	0.6
Plates:						
(i) Over ¼ in. thick	34.0	29.6	33.5	34.8	25.4	23.8
(ii) Under ¼ in. ..	20.3	17.7	18.6	18.9	17.4	18.8
Other heavy prod.	53.0	41.8	54.7	49.0	39.9	41.4
Ferro-concrete bars ..	8.9	7.6	6.9	8.1	8.7	8.7
Wire rods ..	23.3	21.5	18.8	19.7	24.5	24.2
Arches, etc. ..	11.0	8.6	10.4	9.8	8.9	8.5
Other light sections	38.7	29.1	30.5	27.3	32.6	30.5
Bright steel bars ..	7.0	6.2	6.2	6.3	7.7	7.1
Hot-rolled strip ..	23.1	22.6	22.0	21.6	27.3	26.9
Cold-rolled strip	7.1	7.0	7.3	6.6	7.8	7.3
Sheets, incl. coated:						
(i) Hot-rolled	13.0	10.6	11.5	10.1	10.4	10.1
(ii) Cold-reduced ..	29.1	31.1	29.4	28.2	38.8	34.7
Tinplate:	15.8	18.7	19.6	19.2	21.5	20.5
Blackplate	1.0	0.8	0.9	0.7	0.6	0.6
Tubes up to 16 in	22.1	19.0	18.3	19.1	20.9	18.1
Tube, pipe fittings	0.5	0.4	0.3	0.3	0.4	0.4
Tyres, wheels, axles	5.1	4.5	5.0	4.9	3.0	2.6
Forgings (excl. drop)	3.1	2.6	2.8	3.1	2.4	2.5
Steel castings ..	4.6	4.2	4.3	4.1	3.9	3.7
Tool and magnet	0.3	0.2	0.2	0.2	0.2	0.3
Total	342.3	300.5	320.5	308.8	318.5	304.2
Alloy steel	17.8	16.1	16.1	18.1	19.1	17.4
Total deliveries from UK production[6]	360.1	316.6	336.6	326.9	337.6	321.6
Add: Imported finished steel	9.6	7.1	7.2	8.4	9.7	8.3
	369.7	323.7	343.8	335.3	347.3	329.9
Deduct: Intra-industry conversion[7]	48.2	41.2	41.9	41.1	51.1	46.5
Total deliveries new *material*	321.5	282.5	301.9	294.2	296.2	283.4

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys, Leics, Notts, Northants and Essex	17	0.5	20.4	16.9	1.2	—	39.0
Lancs (excl. N.W. Coast), Denbighs, Flints, and Ches ..	7	—	21.6	—	—	1.4	23.0
Yorks (excl. N.E. Coast and Sheffield)	—	—	—	—	—	—	—
Lincs	8	—	39.8	—	—	—	39.8
North-East Coast	17	3.0	39.8	—	—	0.7	43.5
Scotland ..	5	0.2	13.2	0.6	—	—	14.0
Staffs, Shrops, Worcs, Warwicks	4	—	5.6	0.9	—	—	6.5
S, Wales and Monmouthshire	10	2.8	49.5	1.0	—	—	53.3
Sheffield	2	—	3.5	—	—	—	3.5
North-West Coast	7	11.6	—	0.2	—	0.9	12.7
Total	77	18.1	193.4	19.6	1.2	3.0	235.3[4]
May, 1959 ..	80	19.0	198.5	17.3	1.4	4.3	240.5
June, 1958	88	23.7	193.4	22.0	0.6	3.5	243.[illegible]

[1] Used in non-food manufacturing industries.

[2] Weekly average of calendar month.

[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.

[4] Five weeks, all tables.

[5] Other than for conversion into any other form of finished steel listed.

[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.

[7] Material for conversion into other products also listed in this table.

aw Material Markets

Iron and Steel

of detail in some of the Iron and Steel
ximum price schedules became effective on
The changes have no appreciable effect on
level of iron and steel prices. Certain
quality extras chargeable by plate pro-
e been reduced. Minor changes have been
loy forging ingot extras applicable to special
teels. The extras chargeable for small
ales by producers trading as stockholders
increased in some cases. Alterations have
in the basic, hematite, and foundry iron
and, in particular, prices will in future
ivery from railway stations to works without
cost to consumers.

mula under which the prices of strip mill
e varied in accordance with the average
tin has been modified so as to eliminate
anges in the prices of tinplate. In conse-
e prices of strip mill tinplate which would
n to-day (Thursday) under the previous
ill not now do so. Maximum price control
emoved from the relatively small quantities
, tinned sheets, and blackplate still produced
ills.

el of output at the ironfoundries varies
to the type of castings produced and the
f business available from the trades for
y cater. For some considerable time the
igh-duty castings has been foremost. The
g and speciality foundries supplying to the
hicle industry have benefited because the
from that industry have been maintained
rate and requirements show no diminution:
ome of the delivery schedules have been
.

teelworks and some sections of the engineer-
improved demands for castings are now
ng. The machine-tool trade, while showing
nprovement, is not yet specifying the tonnage
s previously consumed and the foundries
inly produce for that trade are generally
work, as also are the foundries depending on
s for castings for railway equipment.

light-castings trade, many of the foundries
o obtain improved outputs, due to the higher
for domestic utensils. From the building
re has also been some improvement, which,
d, will be maintained, although seasonal in-
nay later have an adverse effect. The jobbing
are fairly well employed, but the foundries
for the textile trades are only moderately
.

des of pig-iron are plentiful, apart, perhaps,
rtain brands of low-phosphorus pig-iron.
es of equal analysis and price are available,

continues to be an appreciable demand
engineering foundries for low-phosphorus
d those in need of hematite and refined
readily supplied. Makers of high-phos-
ig-iron have tonnages to spare, and the
using this grade are able to obtain supplies
and in the quantities required. Consign-
f pig-iron, mostly in the high-phosphorus
ntinue to be shipped, but prices have to be
level to obtain the business against strong
on from overseas producers.

-rollers maintain their improved level of
n and demands for small bars and light
together with reinforcing rods, are keeping the mills fully employed. The expansion in the requirements of steel semis continues and most home steelworks have sufficient orders on hand to cover outputs for several weeks ahead. This position is likely to persist—and it may even become more acute—until the re-rollers are able to replenish their meagre stocks in addition to obtaining the necessary supplies of billets, blooms, etc., to implement the work on hand. Arisings of suitable defectives and crops at the steelworks are readily absorbed.

Non-ferrous Metals

Non-ferrous metals continue to be dominated by the strike position in the United States. On the one hand, the strike in the copper industry, which is tying up about 75 per cent. of production capacity, can be regarded as a bullish influence, as stocks are decreasing rapidly and the prospect of a shortage of metal in the not too distant future is now a reality. In fact, this position is made much grimmer by the possibility of a strike in the El Teniente mine in Chile and a dock strike in the US, both of which are half expected to start to-day (Thursday). In the ordinary course of events the price of copper would be rising rapidly on both sides of the Atlantic. However, the steel strike in the US has been going on now for so long that its overall effect on the US economy is the stronger of the two influences—so far, anyway—and the price has not changed very much in London and not at all in the US, where custom smelters continue to quote 33 cents and producers 31½ cents a pound.

It may well be that the stock position is still considered to be high enough to allow consumers to play their game of "wait and see" a little longer before being forced into the market. The outlook, therefore, is somewhat uncertain. In so far as the steel strike is concerned, the belief is growing that it will require the intervention of President Eisenhower invoking the Taft-Hartley Act to bring the steelworkers back into operation before agreement is reached. Some observers feel that if this is done the copper mines may also resume production. In any event, both strikes look like going on for another couple of weeks, by which time copper stocks in the hands of US consumers will be either exhausted or nearly so.

In London, the market is sensitive to conditions prevailing on the other side of the Atlantic, and the quotation is fluctuating narrowly. The feature of the London market this week, perhaps, was the unexpected rise in copper stocks by 425 tons to 13,238 tons.

Tin, though continuing reasonably steady, is showing a weaker undertone than for some time past. This is attributed to the bleak outlook for the settlement of the steel strike which will curtail consumption of the metal and to the beginning of the new quota period to-day (Thursday). It is believed that the buffer stock manager has been selling metal in the market on account of the British Government. Tin stocks last week showed a small rise of 34 tons and now stands at 8,594 tons.

In the United States, the price is not far short of $1.03 a pound.

Lead is without feature on either side of the Atlantic. In London lack of interest has pushed the quotation below £70 a ton. In the US, the market is also dull and the price is called 13 cents a pound. Zinc, too, has come under the influence depressing the non-ferrous metal markets. Lack of consumer interest has shaded the price slightly. However, demand is still satisfactory and the fact that the backwardation still exists reflects a shortage of nearby metal. In the US, the quotation remains unchanged at 12 cents a pound.

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

September 30, 1959

PIG-IRON

Foundry Iron. No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 0s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron. Over 0.10 to 0.40 per cent. P, 10 ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s 0d., delivered Grangemouth.

Cylinder and Refined Irons. North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable. P, 0.10 per cent. max.: North Zone, £26 6s 0d., South Zone, £26 9s. 0d.

Hematite. Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10 ton lots or over: N.-E. of England (local iron), £24 14s. 0d., Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 0d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron. £20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lancs, Rutland, Northants, and Leicestershire, in 10 ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6 ton lots and over). 45 per cent. Si, £40 0s 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium. 50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum. 65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium. 20/25 per cent., 2/8 per cent. C., £230 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten. 80/85 per cent., 11s. 9d. per lb. of W.

Tungsten Metal Powder. 98/99 per cent., 14s. 9d. per lb. of W.

Ferro-chrome [illegible]

Metallic Chromium. [illegible]

Metallic Manganese. [illegible]

Ferro-columbium. [illegible]

Ferro-manganese [illegible]

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs [illegible]

Billets, Blooms, and Slabs for Forging and for Stamping [illegible]

£38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £227 0s. 0d. to £227 5s. 0d.; three months, £228 0s. 0d. to £228 5s. 0d.; settlement, £227 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 2¾d. per lb.; rods, 244s. 6d. per cwt. basis; 20 s.w.g., 279s. 6d. per cwt.

Tin.—Cash, £793 10s. 0d. to £794 9s. 0d.; three months, £793 0s. 0d. to £793 10s. 0d.; settlement, £794 0s. 0d.

Lead (Refined Pig).—Second half September, £69 10s. 0d. to £69 12s. 6d.; second half December, £70 17s. 6d. to £71 0s. 0d.

Zinc. Second half September, £87 5s. 0d. to £87 15s. 0d.; second half December, £85 10s. 0d. to £85 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £121 [illegible]; rolled zinc (boiler plates), all English destinations, £118 15s. [illegible]; zinc oxide (Red Seal), d/d buyers' premises, [illegible]

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10½d. per lb.; [illegible] rolled metal, [illegible] per cwt.

Brass [illegible]

Brass High Tensile.—[illegible] HTB2, [illegible]

Gunmetal. [illegible] G1, [illegible]

Phosphor Bronze. [illegible]

Leaded Phosphor Bronze. [illegible]

Phosphor Bronze Strip, etc.—[illegible] per cwt.; [illegible] chill [illegible] CHARLES CLIFFORD, [illegible]

Nickel Silver, etc. [illegible] per [illegible] per cent. [illegible]

Other Metals. [illegible] per lb. [illegible] quicksilver, [illegible] aluminium, [illegible]

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Central 9969

Company News

A drop of over £1,000,000 in the group net profits for the six months to June 30, 1959, was due, states the half-yearly report of Vickers Limited, to declining sales of aircraft, continued slackness in certain sections of the English Steel Corporation, Limited, lack of recovery in Canadian heavy engineering and shipbuilding, and by further provision for development costs of new aircraft. While the group's engineering business and shipyards are active and there are signs of some gradual improvement in steel and Canadian interests, the second half-year's profits are likely to show little change.

Sales for the half-year (excluding sales within the group) amounted to £73,030,000 (£89,480,000) and the group net profit contracted to £1,780,000 (£2,870,000). The full year's sales for 1958 totalled £176,850,000 and the profit £6,590,000. The interim dividend is maintained at 2½ per cent., a total of 10 per cent. having been paid for 1958.

Peerless & Ericsson, Limited, food preparing machinery manufacturers, of London, N.W.9.—The preference dividend due to-day, will not be paid.

Bennis Combustion, Limited—There is no ordinary dividend for the year to April 30, 1959. In the previous year there was an interim of 2½ per cent., but no final. Group trading profit, after writing back provisions not required on contracts not yet completed, is £23,671 (£7,468).

Gloucester Railway Carriage & Wagon Company, Limited—Group profits for the year ended May 31, 1959, fell to £393,580 (£493,686), and after tax of £193,647 (£267,553), the net profit is £206,952 (£227,239). The dividend is repeated at 15 per cent. with a 10 per cent. final.

Dominion Steel & Coal Corporation, Limited (controlled by A. V. Roe, Canada, Limited)—The directors have declared a dividend of 10 cents per share, payable October 28. Payments of 25 cents quarterly have been made previously. The reduction, it is stated, is attributable to the "extremely tight credit situation and substantial expenditure programme now in progress."

Associated Electrical Industries, Limited—A second interim of 6d. per £1 unit is declared, making 1s. per unit to date, as before. A total of 3s. per unit was paid on a smaller capital for 1958. In the half-year to June 30, 1959, group trading profit (unaudited) rose to £7,750,000, compared with £6,990,000 in the first half of 1958. Group net profit, before tax, was £5,010,000 (£4,840,000).

Plessey Company, Limited, radio, electronic, and instrument manufacturers, of Ilford (Essex)—The offer to shareholders of 3,600,000 10s. ordinary shares at 23s. 6d. per share met with acceptances totalling over 99 per cent. Applications were received for nearly 800,000 additional shares. Basis of allotment for the additional shares is that applicants for up to 10 shares receive allotment in full and applicants for over 10 shares each receive 10 shares.

Cambridge Instrument Company, Limited—An unchanged quarterly interim dividend, payable on September 30, of 6d. per £1 share, tax free, was announced. The chairman, Dr. P. Dunsheath, stated that no alteration was anticipated in the interim dividend to be paid in the current year, but an adjustment of the final dividend may be expected. Demand for the company's products was satisfactory, he adds, and recent developments are producing additional orders. New 22,000 sq. ft. research laboratories are to be opened at Cambridge on October 14, and a 9,000 sq. ft. extension at the Muswell Hill works will shortly be occupied.

Cammell Laird & Company, Limited, shipbuilders, marine engineers, and boilermakers, etc., of Birkenhead—The interim dividend is cut from 4 to 3 per cent. and members are warned that a considerable reduction in the group profit for 1959 must be anticipated. With a special interim, the effective total payment for 1958 was 15 per cent. on the one-class £5,325,000 ordinary capital. Results of the subsidiary, Cammell Laird & Company (Shipbuilders & Engineers), Limited, will be adversely affected by the inter-union disputes which occurred earlier in the year. At the Patent Shaft Steel Works, Limited, although there has recently been some improvement in the order position, prolonged difficulties in bringing the new plant into production have so far prevented the works from operating at a profit.

Serck, Limited—The company has acquired the whole of the share capital of the Visco Engineering Company, Limited, Croydon. The purchase consideration is the issue to the Visco shareholders of 55,570 new 5s. ordinary shares in Serck, together with a cash payment of £222,804 financed out of the company's current resources. The Visco company manufactures filters, air heaters, heating, ventilating, and air-conditioning plant, and water and oil coolers, etc., its products being complementary to some of those already manufactured in the Serck group. Visco profits over the last three years have averaged approximately £60,000 per annum before tax, and it is anticipated that this acquisition will provide a useful addition to the group profits in the future. In order to level up the ordinary capital of the company, the board has also sold through its official brokers a further 3,430 new ordinary shares of 5s. each at the current market price and the resulting premium is being placed to capital reserve account.

Increases in Capital

Jessop-Saville (Small Tools), Limited, Sheffield, increased by £88,000, in £1 ordinary shares, beyond the registered capital of £2,000.

G.W.B. Furnaces, Limited, Dudley (Worcs), increased by £250,000, in £1 ordinary shares, beyond the registered capital of £250,000.

Davy-United, Limited (formerly Davy & United Engineering Company, Limited), Sheffield, increased by £2,000,000, in £1 shares, beyond the registered capital of £2,000,000.

Holt, Siron & Company, Limited, manufacturers and casters in brass, etc., of Birmingham, increased by £35,000, in £1 ordinary shares, beyond the registered capital of £15,000.

Burgess Engineering (Stoke-on-Trent), Limited, iron masters and founders, etc., of Alsager (Staffs), increased by £4,500, in £1 ordinary shares, beyond the registered capital of £500.

Follsain, Limited (formerly Follsain-Wycliffe Foundries, Limited), Lutterworth, near Rugby, increased by £110,000, in 140,000 6 per cent. non-cumulative preference shares of 10s. and 200,000 ordinary shares of 4s. each, beyond the registered capital of £170,000.

Rotary Hoes, Limited, West Horndon (Essex), increased by £350,000, in 5s. ordinary shares, beyond the registered capital of £900,000.

Metal Box Company, Limited, London, W.1, increased by £5,000,000, in £1 ordinary shares, beyond the registered capital of £20,000,000.

P. I. Castings (Altrincham), Limited, Altrincham (Ches), increased by £65,000, in £1 ordinary shares, beyond the registered capital of £35,000.

East Sussex Engineering Company, Limited, Lewes (Sussex), increased by £25,000, in £1 ordinary shares, beyond the registered capital of £25,000.

John Ackworthie, Limited, machine-tool makers, etc., of Kenilworth (Warwickshire), increased by £10,000, in £1 ordinary shares, beyond the registered capital of £15,000.

Asquith Machine Tool Corporation, Limited, Halifax, increased by £150,000, in £1 new 6 per cent. cumulative preference shares, beyond the registered capital of £3,083,500.

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Publications Received

The Ward Group of Companies—Products and Services. Published by Thos. W. Ward, Limited, Albion Works, Savile Street, Sheffield.

When a group has 45 subsidiary and associated companies, plus 25 branch works, there is obviously a need for a publication covering all the activities and services undertaken. The connection of the Ward group with the foundry is indeed intimate, as castings are made in several plants. Others supply non-ferrous ingots, moulding sands, foundry plant, and protective clothing, whilst Thos. W. Ward are also important pig-iron and coke merchants. Yet in this 68-page beautifully illustrated brochure, these activities take up but two or three pages. The rest is a fascinating story of the growth of a gigantic, world-wide organization in less than 100 years, from what was originally a local coal-merchant's business. The weakest part of the publication is the index, which is by no means comprehensive. The use of the term "sandblast" can, so far as this country is concerned, be regarded as virtually archaic, except perhaps in connection with the use of zircon sand. The publications department of Thos. Ward, Limited, is to be congratulated on the work they have done in turning out such an excellent brochure.

GEC Export Guide, Vol. III, No. 3. Issued by the Economic and Marketing Research Unit of the General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2.

This issue, which in the usual manner covers over 30 product groups for a like number of countries, makes more-cheerful reading, for whereas in the previous issue of the *Guide* in April, prospects were good in 13 countries, the number has now risen to 14. Improving conditions are noted in ten countries as against eight; deterioration is now shown in six markets (before it was eight), whilst in the last category—bad prospects—the description now applies to only four countries (an improvement of one). The *Guide* states that improved conditions exist in Argentina, Australia, Belgium, Denmark, Italy, Netherlands, Pakistan, USSR and W. Germany. Prospects are not favourable in Iraq, Kenya, New Zealand, Norway, Spain and South Africa.

United Dominions Trust, Limited. Published from United Dominions House, Eastcheap, London, E.C.3.

This 40-page, interestingly illustrated, booklet details the history, growth and activities of a huge company. "Boiled down," the activities consist of moneylending for the acquisition of industrial plant, motor-cars and other goods. If money be needed for foundry plant, it can be assumed that this type of company will finance either the seller or the buyer. This is the second edition of the brochure as, since publication of the first one, Barclays Bank have taken up 1,000,000 new ordinary shares in the company, thus considerably increasing the group's reserves, and rendering the earlier issue obsolete.

Directory of Members. Issued for the Association of Bronze and Brass Founders, by Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15.

This is a very useful publication as, besides being a list of names and addresses, it answers such queries, for example, as to what member-firms make shell-moulded castings and their geographical location, or which foundries are mechanized for repetition castings, which manufacture centrifugal castings, and so on. Any organization operating an information bureau should certainly acquire this Directory as it is a most useful source of information not readily obtainable elsewhere. Purchasing officers will find it a most useful work of reference.

Accidents, No. 40. Published by H.M. Factory Inspectorate, Ministry of Labour and National Service, by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 1s. 3d. net.

It would appear that the major part of the accidents described and illustrated in this booklet, could have been prevented by the exercise of a modicum of commonsense and foresight, but others do not enter into this category. For instance, one accident is reported involving an electro-magnet, which though switched off, had sufficient remanent magnetism to attract metal and so cause injury to an operator's fingers. Most of the accidents covered in the publication enter into the "unusual" category, but the general lesson to be derived is the need for continuous watchfulness on everybodys part.

New Catalogues

Foundry Plant. J. W. Jackman & Company, Limited, Vulcan Works, Blackfriars Road, Manchester, 3, have issued a series of *Bulletins* covering their manufactures. *Bulletin No. 3*, which deals with coreblowers, moulding machines, and foundry systems, has already been reviewed in the JOURNAL, though, through a misprint, it was referred to as No. 4. *Bulletin No. 4* is actually devoted to compressed-air-operated shotblast and shot-peening equipment. In its 36 pages, the introduction tells of the various abrasives available; on page 2, four types of equipment are briefly described; and page 3 is devoted to notes on design. Thereafter the four main types are dealt with in detail, including many variations from standard. The *Bulletin* concludes with descriptions of dust-extraction equipment.

Bulletin No. 1, "Combined Shotblasting and Decoring Equipment," describes a specialized application of shotblast. In this system castings (especially steel castings) are taken to the shotblast chamber straight from the mould, the operation being specially designed to cope with the extra amount of sand involved. The system involves the use of both magnetic collection and demagnetization of useful abrasive and other special features.

Bulletin No. 2 is devoted to hardness-testing machines, and from it, it is surprising to learn of the many variations there are of the standard bench-type Brinell machine. There are machines for the continuous testing of the exterior hardness of tubes, bars and the like, and for ascertaining the hardness of the interior surfaces of tubes and cylinders; other machines deal with thin strip, such as razor blades.

Further *Bulletins* are promised for the future.

Metal Finishing. The metal finishing division of the Pyrene Company, Limited, Great West Road, Brentford, Middlesex, has issued a leaflet covering Endurion. This is an immersion process which imparts to the zinc-phosphate or "Parkerized" surface of ferrous metals a dense, fine-textured, corrosion-resistant finish. An interesting fact is that it is obtainable in a variety of colour finishes, which are useful in the stores for identification purposes. The plant used for this process is quite simple and where Parkerizing is practised, one, or two—in the case of colour work—additional tanks are necessary.

HISTORICAL NOTE

W. J. Mariner & Co. Ltd., of Luton were established in 1909 and have just completed 50 years as Non-Ferrous Founders. They produce castings of very varied types and sizes both in Aluminium and Bronze for all classes of Engineering, and also manufacture very largely for the hatting industry. They are A.I.D. approved.

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Imports and Exports of Iron and Steel in August

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in August. Totals for the first eight months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended Aug. 31.	Eight months ended August 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Cyprus	247	4,332	1,158
Sierra Leone	954	8,960	7,007
Ghana	1,853	9,602	19,768
Nigeria	6,766	44,288	51,200
Union of South Africa	2,406	68,855	28,485
Rhodesia and Nyasaland	1,383	26,071	14,393
Tanganyika	2,532	8,468	12,862
Kenya	3,610	29,220	15,608
Uganda	368	2,237	3,292
Mauritius	123	2,505	947
Aden	255	2,145	2,003
Bahrein, Qatar, and Trucial States	305	6,049	5,210
Kuwait	269	30,639	7,701
India	16,825	90,433	120,702
Pakistan	4,698	43,263	24,378
Singapore	1,568	23,669	14,537
Malaya	589	10,566	7,018
Ceylon	2,837	19,937	30,021
British North Borneo	42	1,500	1,785
Hongkong	3,697	38,156	44,456
Australia	4,937	65,572	54,590
New Zealand	6,515	127,219	61,740
Canada	21,265	123,830	121,226
Jamaica	1,465	13,841	14,717
Trinidad	3,190	34,890	29,250
British Guiana	297	5,223	4,502
Other Commonwealth countries	3,110	25,522	24,682
Eire	4,012	33,285	31,469
Soviet Union	5,707	12,105	13,208
Finland	2,915	34,562	22,980
Sweden	7,193	84,792	74,884
Norway	5,731	60,823	58,160
Denmark	6,541	59,869	62,642
Western Germany	12,375	29,344	75,695
Netherlands	8,707	54,562	64,575
Belgium	2,117	15,202	19,379
France	388	2,750	2,015
Switzerland	723	7,040	5,533
Portugal	793	9,537	10,530
Spain	1,203	34,492	20,318
Italy	2,772	29,449	34,446
Austria	239	7,251	2,347
Yugoslavia	504	3,000	2,280
Greece	878	9,568	7,850
Turkey	362	3,521	4,421
Netherlands Antilles	175	1,312	1,869
Portuguese East Africa	120	1,680	930
Egypt	858	11,673	2,130
Sudan	445	27,261	5,355
Lebanon	79	8,563	1,818
Israel	2,633	5,034	10,378
Saudi Arabia	34	3,498	2,858
Iraq	4,167	24,505	54,960
Iran	4,129	23,807	20,956
Burma	616	6,568	6,271
Thailand	371	5,024	6,048
Indonesia	105	1,542	3,415
Philippine Republic	1,100	2,327	4,177
USA	24,145	52,102	114,627
Cuba	441	3,825	4,921
Columbia	198	4,831	1,734
Venezuela	4,877	52,898	51,452
Ecuador	167	2,032	713
Peru	368	7,665	1,789
Chile	174	3,744	1,089
Uruguay	25	721	730
Argentina	19,787	95,635	142,099
Other foreign countries	14,935	78,113	184,657
TOTAL	235,215	1,782,504	1,860,946

A GIFT OF £50,000 has been made by the English Electric Company, Limited, to the new College of Technology at Stafford. It is thought that the money will be used to buy extra equipment and the company *has intimated that* as equipment becomes out of date it *will renew it.*

Total Imports of Iron and Steel

From	Month ended August 31.	Eight months ended August 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	998	4,507	3,979
Canada	2,402	14,769	12,156
Other Commonwealth countries and Eire	2,724	16,758	22,075
Soviet Union	6,094	107,701	31,464
Sweden	2,984	23,044	18,218
Norway	8,831	50,031	55,862
Poland	283	173	3,506
Western Germany	9,116	54,042	44,481
Netherlands	7,439	98,072	110,918
Belgium	1,151	79,429	15,677
Luxembourg	178	5,026	4,673
France	965	15,010	14,375
Italy	1,232	4,654	9,286
Austria	169	3,629	2,706
Japan	—	2,544	—
USA	1,247	113,667	19,184
Other foreign countries	1,044	3,574	10,594
TOTAL	46,857	596,630	379,156
Iron and steel scrap and waste, fit only for the recovery of metal	131	57,766	2,642

Exports of Iron and Steel by Products

Product.	Month ended August 31.	Eight months ended August 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Pig-iron	12,865	85,629	85,078
Ferro-columbium (niobium)	6	26	32
Ferro-tungsten	38	409	777
Other ferro-alloys	1,274	2,254	4,261
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	8,048	8,311	50,578
Pieces roughly shaped by forging*	40	5,265	996
Iron bars, rods, angles, shapes, and sections	65	1,083	815
Steel bars, rods, angles, sections, and shapes	45,399	226,343	260,663
Iron plates and sheets	49	2,030	287
Universal plates	586	3,185	5,200
Steel plates, 3mm. and under 4.5mm. thickness	2,159	5,409	28,762
Ditto, 4.5mm. or more in thickness	12,182	121,958	122,005
Blacksheets and blackplate	20,504	190,374	174,673
Hoop and strip	7,314	43,927	56,690
Tinplate	36,925	243,772	312,746
Decorated tinplate	549	2,334	6,078
Galvanized sheets	6,659	51,232	59,894
Other (incl. tinned sheets, terneplate, and ternesheets)	2,267	8,857	14,804
Railway and tramway construction material	12,138	175,701	110,081
Wire rods of steel (incl. alloy steel)	1,925	23,235	32,525
Wire	7,739	68,169	69,693
Tubes, pipes, and fittings	56,484	513,001	464,310
TOTAL	235,215	1,782,504	1,860,946

* The figures for 1959 are not completely comparable with those for previous years.

THE REGISTERED office and transfer office of Tipper Industries, Limited, malleable ironfounders, manufacturers of gas, water, and steam tubes, etc., is now at City Centre House (12th floor), 30, Union Street, Birmingham 2.

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TRADE JOU

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Commercial Editor: P. E. CARDEN

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Production Manager:
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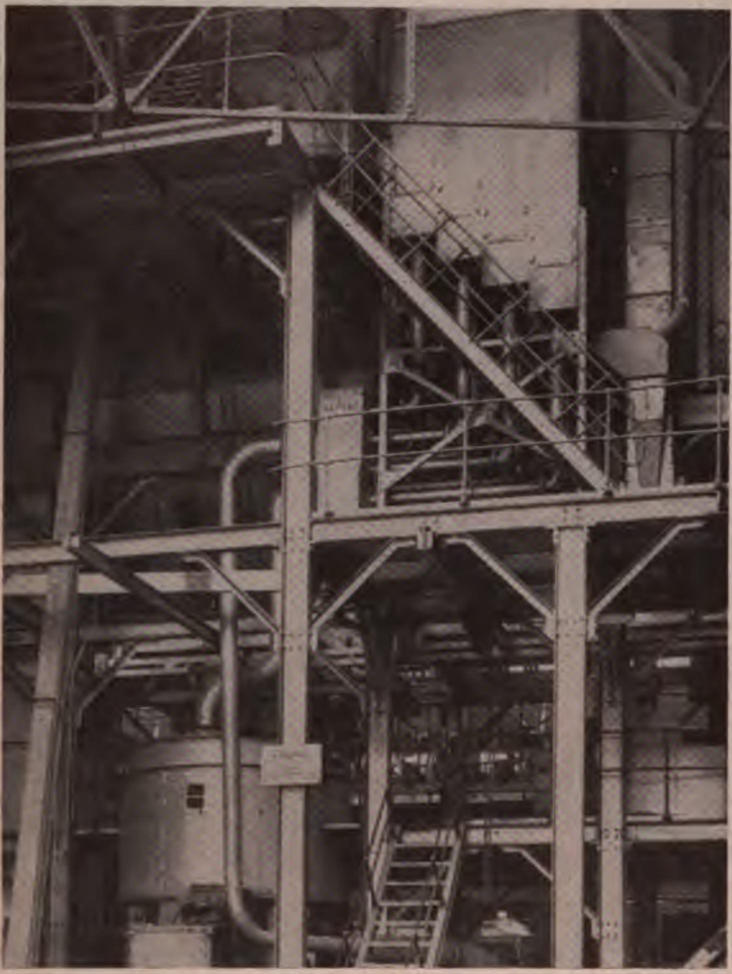

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FOUNDRY
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To Buy or Make?

Two-hundred-and-fifty years ago, Abraham Darby mined his own coal and iron ore, made pig-iron, quarried his own sand, and made his own plant and patterns to produce iron castings. Over the years, the majority of ironfounders have gradually reduced these activities and concentrated upon the economic production of castings. The reason for this change is the simple fact that even the most elementary system of costing showed that they could buy from specialized producers cheaper than they could mine, quarry, or manufacture machinery.

There is left, however, the problem of patternmaking. Here, the situation is complicated by convenience, for obviously small alterations and repairs can be made more easily in an attached shop than by using the services of a master patternmaker. This feature apart, we are convinced that in many cases, it costs more to make patterns in an attached shop than to buy them. Already, this fact has been recognized in America, where in general, recourse is had to specialist patternmaking firms and in that country a very important business has grown up for servicing the foundries. In the UK, also, a parallel development is rapidly taking place and we estimate that since the war between £750,000 and £1,000,000 has been spent by the master patternmakers in the equipment of their shops with the latest labour-aiding plant.

In recent years, a number of master patternmakers have individually visited America, whilst collectively, they have inspected the major patternshops of Paris and Germany. They have enlarged their scope so that now they can supply the foundries with pressure-cast patternplates or resin patterns. A recently-issued series of graphs shows that the ironfounding industry has been operating at a lower margin of profit than others—a distinctly unhealthy situation. Thus, we counsel foundry executives carefully to ascertain their overall patternshop costs and those for individual jobs and compare them with quotations submitted by master patternmakers. As the major cost of a pattern is labour, the net can be spread fairly wide, for transport is not such an important factor.

Stanton's Ore-preparation Plant

Last week saw the official opening by Mr. F. le Neve Foster, a director of Stewarts and Lloyds, Limited, of the new £4,000,000 ore-preparation plant of the Stanton Ironworks Company, Limited, at Ilkeston (Derbys). The plant is designed to process between 25,000 and 30,000 tons of ore per week, and it is expected to enable the company to improve the efficiency of the blast furnaces at the site, increase the output of pig-iron, and allow large reserves of home ore which are at present unsuitable without preparation, to be used. In its essence, the new plant comprises three sections, for: (*a*) primary and secondary crushing and grading of incoming ore; (*b*) ore stocking and blending of these stocks by the layering method, and (*c*) the sintering of ore fines with the addition of coke breeze and selected imported ore. The site covers 40 acres, more than six miles of conveyor belting is in use and there are sidings for 700 wagons. Altogether, about 150 men are at present employed, including electrical and maintenance staff. A particular feature is made of full instrumentation and regulation of cyclic operational sequences.

Present and Future Possibilities

Discussing the new plant at a meeting with representatives of the Technical Press on the day before the actual opening ceremony, Mr. N. C. Macdiarmid, managing director, explained the reasons which had led Stanton to instal this quite expensive equipment. Up to the present, he said, it had been possible to continue the traditional ironmaking method at Stanton largely with home-produced ores, but, now, home-ore quality was such that this could no longer be done, especially with the increased requirements within the UK foundry industry for irons with lower phosphorus contents. With the new plant, it was hoped to continue with home-produced ores, to reduce coke consumption in the blast furnace, and possibly to lower the cost of iron produced and hence, ultimately, its selling price.

In addition, the use of sinter ore would give iron of greater consistency of composition and might ultimately offer the possibility of taking hot metal from the blast furnace direct to suitable applications within the Stanton foundries—but here there was much need for research.

Answering questions, Stanton executives present explained that while 2½ to 3½ cwt. of coke per ton of iron produced in the blast furnace might be saved by using sinter, some extra coke (in the form of hitherto surplus coke breeze) was used in the sintering plant. The net saving to be realized at a 40 per cent. sinter utilization in the blast-furnace charge might be of the order of 1 to 1½ cwt. of coke per ton of iron.

The primary design of the new plant was the work of Stanton engineers, co-opting the services of their main contractors for subsidiary features; the site permitted space for a total of three sintering plants. Sintering reduced the firm's reliance on certain types of imported ore and permitted the inclusion of powdered ore from abroad in the ore blend. Furthermore, by increasing the amount of imported ore in the sinter, it would be possible to programme one or other of the company's blast furnaces to produce any iron compositions between 0.7 and 1.4 per cent. phosphorus. On the primary ironmaking plant at Stanton, already of basically modern design, approximately £10,000,000 had been spent in improvements since the war, it was stated. A concluding remark was that to get full efficiency from the plant as a whole it would be necessary to operate it at near full capacity—a prerequisite *being increased sales of pig*-iron to founders.

Forthcoming Events

OCTOBER 12

Institution of Production Engineers

Presentation of the E. W. Hancock paper "Human Relations in Industry," by R. A. Banks, 6.30 p.m., in the Large Lecture Theatre. Engineering Faculty, University of Bristol. (Meeting open to non-members, but admission by ticket only, available from the secretary of the Institution, 10 Chesterfield Street, London, W.1.)

OCTOBER 13

Institution of Production Engineers

London graduate section: "Properties and Application of Modern Precision Grinding Wheels," by J. Manning, 7.15 p.m., at 10, Chesterfield Street, Mayfair, London, W.1.

Institute of British Foundrymen

Coventry section: Presidential address, followed by "Development of Cast Metals," by H. T. Angus, Ph.D., M.Sc., 7.30 p.m., at Coventry Technical College, Room A5.

Combustion Engineering Association

Northern region: Brains Trust on "Furnace Operation." 10.30 a.m., at the Grand Hotel, Sheffield.

OCTOBER 14

Institution of Plant Engineers

East Midlands branch: "Jodrell Bank Radio Telescope." by C. N. Kington, 7 p.m., in the Sherwood Rooms, County Hotel, Theatre Square, Nottingham.

OCTOBER 15

Institution of Plant Engineers

Blackburn branch: "Operational Research in the Steel Industry," by G. D. Jordan, 7.30 p.m., at the Castle Hotel, Blackburn.

Glasgow branch: "The Engineer's Approach to Nondestructive Testing of Metals," by H. Potter, 7.15 p.m., at the Scottish Building Centre, 425/427, Sauchiehall Street.

Iron and Steel Institute

Joint meeting with the Corrosion group of the Society of Chemical Industry for discussion of the sixth report of the Corrosion Committee (published recently as No. 66 in the Special Report series of the ISI). Sections covering atmospheric corrosion, protective coatings, and marine corrosion will be dealt with. 2 p.m. at 14, Belgrave Square, London, S.W.1, admission by ticket only, available from the secretary, ISI, at the address quoted.

Institute of British Foundrymen

Beds & Herts section: Presidential evening at W. H. Allen Sons & Company, Limited, Bedford, 7.30 p.m.

Institute of Vitreous Enamellers

Northern section: "Spray-painting Methods," lecture and film by a member of the Aerograph Devilbiss Company, Limited, 7.30 p.m., Old Nags Head, Deansgate, Manchester.

Midland section: "Chemical-resistance of Enamels on Domestic Equipment," by N. S. C. Millar, 7.30 p.m., at the Birmingham Exchange and Engineering Centre.

Aluminium/Zinc Castings Exhibition

Last week, Main Metal (Great Britain), Limited, at their new offices at Bridge House, 181, Queen Victoria Street, London, E.C.4, staged an exhibition of sand and die-castings—including bearings made from Main Metal. Ingots of this aluminium/zinc-base alloy are now made for the proprietors by International Alloys, Limited. The alloy has a fairly long freezing-range and the exhibits showed clearly that where proper feeding and running conditions were applied this lightweight alloy gives excellent results. The co-operative exhibition included some excellent examples of the founder's art from many well-known makers of castings.

Instruments, Electronics and Automation Exhibition

The International Instruments, Electronics and Automation Exhibition, which is organized by Industrial Exhibitions, Limited, 9, Argyll Street, London, W.1, is to be held at Olympia, London, in May, 1960. More than 450 firms will be participating and of these at least 100 will come from overseas. It is reported that there is already a waiting list of exhibitors.

British Steel Castings Research Association

The following extracts from the BSCRA sixth annual report commence with a summary of the general set-up of the Association, its committees and membership. The section on research is then dealt with *in extenso,* under the headings: steelmaking; foundry processes and materials; metallurgy; plant engineering, and industrial health.

The following article has been taken from the recently-issued report of the British Steel Castings Research Association, covering the Association's activities up to March 31, 1959.

GENERAL

The year ending March 31, 1959, was the final year of the first quinquennium of grant aid from the Department of Scientific and Industrial Research, the Association having operated under its present title for twelve months before seeking financial support from the Department. The Council has therefore been heavily engaged in reviewing the Association's activities and planning its future development for the purpose of submitting its case for the renewal of grant. The difficulty of this undertaking has been heightened by the fall in the level of trade that has been continuous since the end of 1957, and which will be reflected in the income of the Association in the years 1959-60 and 1960-61. The Council reports that the grant for the quinquennium 1959-64, while greater in amount, is, in accordance with DSIR policy, proportionately less in relation to industrial income. The Council has accepted the terms of grant with satisfaction, and they will enable the Association to finance a substantial proportion of the much needed expansion of activities and premises that had been envisaged.

Council

Dr. R. Hunter has accepted an invitation to become the vice-chairman of the Council, with a view to being elected chairman after the annual general meeting in 1959. It has been further decided that with the firm establishment of the Association and its administration, it is now possible to contemplate a regular change in the chairmanship of the Council, and it is intended that future holders of the office shall each serve for a term of two years.

During the year, Mr. G. M. Menzies retired from the Council on completion of his term of office as chairman of the British Steel Founders' Association; and Mr. M. C. Lloyd was co-opted to fill the casual vacancy caused by the retirement of Mr. A. B. Lloyd on leaving the industry. Mr. Lloyd will retire at the annual general meeting in 1959 in accordance with Article 30. At the same meeting four members will retire in accordance with Article 28, namely Dr. Gregory, Mr. Kain, Mr. Scott and Mr. Rowe.

Mr. F. N. Lloyd, whose term of office as a member of Council also expires this year, is prevented by other commitments from standing for re-election. Mr. Lloyd has been a member of the Council since the inception of the research organization, and was its chairman until December, 1953; and it is therefore with very great regret that the Council has accepted his decision to retire from office.

Committees of the Council

At the close of the last financial year, Mr. F. W. Rowe tendered his resignation from the chairmanship of the finance committee, an office which he had filled most ably since the first appointment of the committee in 1953. The Council regretfully accepted this resignation, and report that Sir William Scott accepted the chair of this committee, which was strengthened by the election of Mr. A. H. Catton and Mr. J. Currie.

The research committee, with Dr. Gregory in the chair, has continued to maintain oversight of the progress of research and to advise the Council on future requirements as regards staff, equipment and accommodation, as well as upon changes in the content and emphasis of the programme of research. Two additions have been made to the membership of the committee, Dr. P. A. Young (Head Wrightson & Company, Limited) and Dr. V. Kondic (department of industrial metallurgy, Birmingham University) having been appointed.

The renewal of application for DSIR grant aid has thrown additional work and responsibility upon both the research and the finance committee, and the Council takes this opportunity to record its appreciation of the support which these committees, and particularly their chairmen, have given to the Association.

Technical Advisory Committee

The function of the five technical advisory committees is to assist the director by advising him on the progress of research projects and to form a link between the industry and the research staff, thus helping to ensure that research projects are adequately related to industrial requirements and that the results of research are interpreted to industry in easily assimilated forms. Those members of the committee who are drawn from member companies are appointed by the director himself, consulting with the committee chairmen, for a period of three years; a small number of other

BSCRA Sixth Annual Report

specialists from outside the industry are also invited to serve on some of the committees.

A major review of the membership of the committees was undertaken in the autumn of 1957, and changes which became effective during 1958-59 were as follow:

Foundry Practice Committee: Mr. F. Cousans (Hadfields, Limited) succeeded Mr. A. B. Lloyd as chairman, and Mr. R. A. Duff (Parker Foundry (1929), Limited) was appointed an additional member.

Moulding Materials Committee: Mr. H. L. Carey (Vickers-Armstrongs (Engineers), Limited), Mr. R. S. Pratt (Wm. Cook & Sons (Sheffield), Limited), Mr. R. Savage (E. Jopling & Sons, Limited), Mr. J. K. Wallett (F. H. Lloyd & Company, Limited), and Mr. R. Wright (English Steel Castings Corporation, Limited), joined the committee. The retirement of Mr. A. E. Scrayfield from English Steel Castings Corporation, Limited, resulted in his retirement also from the committee, and the occasion was marked at a luncheon on April 1, 1958, when the committee chairman, Mr. A. C. Brearley, made a presentation to Mr. Scrayfield on behalf of the committee in recognition of his many pioneering achievements in the development and application of steelfoundry moulding materials. Mr. R. M. Chapman (K. & L. Steelfounders & Engineers, Limited) also retired from the committee on taking up an appointment at Loughborough College.

Plant Engineering Committee: Mr. J. Buchanan (Parker Foundry (1929), Limited), Mr. L. R. Evans (English Steel Castings Corporation, Limited), and Mr. R. H. Whatmough (David Brown Industries, Limited) were appointed.

Steelmaking Committee: Mr. E. Creswick, formerly of Catton & Company, Limited, retired from the committee on taking up an appointment in Canada, and Mr. T. A. Cosh, formerly head of the Association's steelmaking section, was invited to join the committee on joining the Alston Foundry Company, Limited.

General Metallurgy Committee: Mr. P. Jubb (Brown-Firth Research Laboratories), Mr. J. Taylor (David Brown Industries, Limited) Mr. N. Tranter (F. H. Lloyd & Company, Limited), and Dr. B. H. C. Waters (K. & L. Steelfounders & Engineers, Limited) joined the committee. Mr. R. Liston, formerly of Wm. Beardmore & Company, Limited, resigned from the committee on leaving that company's service.

In December, 1956, the general metallurgy committee set up by a sub-committee with Mr. J. Blackburn (Bonnington Castings, Limited) as chairman to assist the staff of the Association in preparing a code of practice for the magnetic-particle method of inspecting steel castings. This work having been completed by the issue to members of a special publication in September, 1957, and an article in the *Journal* of the BSCRA for December, 1958, the sub-committee has been disbanded.

The Council and the director of research welcome this opportunity of expressing their indebtedness to these advisory committees for their valuable help.

Membership

It is satisfactory to report that a further four steelfoundry companies have joined the Association as ordinary members, namely: George Blair & Company, Limited, Tow Law, Co. Durham; R. B. Tennant, Limited, Coatbridge, Scotland; Phosphor Bronze Company, Limited*, Birmingham, and W. A. Baker & Company, Limited, Newport, Monmouthshire. The membership of George Blair & Company, Limited, includes also their wholly-owned subsidiary, Springfield Steel Company, Limited, Glasgow. These additions bring the total number of ordinary members to 64. The Mond Nickel Company, Limited, has been admitted as an associate member, bringing the total in this grade to 11.

DSIR Visitors and Staff

Professor G. Wesley Austin and Dr. C J. Smithells have continued to act as the Department's Visitors during the year, and their interest in the Association's affairs, and the support which they gave to the Association's application for renewal of grant-aid, have been much appreciated by the Council.

The Council also places on record its appreciation of the helpful advice and ready co-operation which it and the permanent staff receive from the officers of the Department.

Research Facilities

Accepting a recommendation of the research committee, the Council has approved a scheme of extension to the research station. The cost during the next financial year will be approximately £40,000 for buildings, and £12,500 for equipment, resulting in a 75 per cent. increase in accommodation. In coming to this decision, the Council has recognized that the present premises were designed for a staff complement of less than 40 and a level of activities related to an annual industrial income of less than £40,000, and that additional laboratory accommodation as well as space and facilities for pilot-scale experiment are essential.

Staff

Mr. T. A. Cosh, B.SC., F.I.M., head of the steelmaking section, resigned from the Association's staff at December 31, 1958, to take up an appointment with the Alston Foundry Company, Limited. Mr. C. M. Stoch, DIPL.ING., F.I.M., head of the plant engineering section, has been appointed acting head of the steelmaking section while retaining his former appointment. Mr. J. Turton, B.MET., formerly of K. & L. Steelfounders & Engineers, Limited, joined the research staff in the steelmaking section and Mr. J. Beech, B.MET., who graduated from Sheffield rsity with first-class honours in metallurgy and he Mappin Medal and Premium for 1958, the physical metallurgy section. Mr. M. yman, B.MET., the Association's bursar in the :ories department of Sheffield University, was the Frank Holland Memorial Prize for the University. With the object of assisting cruitment of suitable graduate investigators, ›uncil offered bursaries tenable for one year metallurgy departments of Birmingham and :ld Universities, to enable two graduates to naster's degrees prior to joining the Association staff. However, it was possible to make ne appointment, and Mr. L. J. Watkins, B.SC., ding the bursary at Birmingham, and will ıe staff of the Association in August, 1959.

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* This company has since discontinued foundry operations. —Editor.

Conferences and Meetings

ıeavier programme of meetings, mainly for scussion of the Association's work with mem- has been held during the year than in any ıus year. In addition to the Annual Con- e, a one-day conference and six area dis- n meetings have been held.

1958 Annual Conference was held at Harro- n October 23 and 24, the subject being "Steel- g and the Properties of Steel Castings." More 150 representatives of members and others connected with the Association's work in eld attended. A special welcome was given . C. W. Briggs, technical and research director Steel Founders' Society of America, who pre- the exchange lecture from the Society; and . F. E. Ireland, H.M. Deputy Chief Alkali :tor, who made an important statement of concerning the implementation of the Clean ct in relation to steelfoundries. Four of the papers discussed at the Conference were pre- . by members of the Association's staff—a ring indication of the progress that has been following only 18 months effective occupa- ıf the research station.

ıas been decided to supplement the annual ences by one-day conferences on themes of specialized interest. Two such conferences been planned during the current year and on metallurgical analysis in steelfoundries— :eld at York on December 4, 1958. It was ed by 73 delegates, representing 35 ordinary associate members and a number of kindred ıtories. The second of the conferences will d in Sheffield on April 30, the theme on this on being the high-frequency melting-furnace :lfoundries.

ereas on several occasions in previous years meetings, discussion groups and demonstra- have been staged by the Association on an c basis, this year saw the inauguration of a :d programme of discussion meetings at which :nt aspects of the Association's research pro- ne were presented for discussion by members.

of the introductory talks were:

easurement and Control of Foundry Dust," . A. H. Sully and Mr. C. M. Stoch; "Causes or Mechanical Properties in Steel Castings," . W. J. Jackson and Mr. J. D. Lavender; and "Reclamation of Used Moulding Sands," by Mr. J. M. Middleton and Mr. R. H. Brown.

These talks were delivered at meetings in Glasgow, Derby, Darlington and Sheffield. The fourth talk in the series will be on oxygen injection, and will be presented in Glasgow in April and in Birmingham in May, 1959, by Mr. C. M. Stoch and Mr. K. Knaggs.

Refresher Courses

Last year's decision to inaugurate a scheme of refresher courses for technical supervisory staff from member companies was warmly welcomed by the industry. Four further courses have been held, each for approximately 10 representatives of members, two of these courses being on the subject of moulding materials and two on steelmaking practice. The demand for the moulding materials course continues, and further courses comprising approximately eight lectures and practical sessions over a period of three and a half days will continue to be held at the research station at about six-monthly intervals.

Publications and Ciné Films

The *Journal and BSCRA Abstracts* have continued publication regularly throughout the year. The latter now incorporates additional supplements for overseas members and associate members.

A large number of translations have been prepared by the Association's staff or acquired externally and made available to members, and important additions have been made to the information section's series of bibliographies.

Two special publications have been issued—"A Practical Guide to the Design of Steel Castings" and "Data Sheets on Dust Collectors." The former is an English-language edition of the book published by the *Centre Techniques des Industries de la Fonderie* in French, and has been placed on sale to the public. The British Steel Founders' Association has co-operated with the Research Association in effecting distribution, and the Penton Publishing Company, Limited were appointed the Association's distributors in the United States. Over 1,400 copies of the publication have already been sold.

"Data Sheets on Dust Collectors" was published as a preliminary edition restricted to members and manufacturing companies who had supplied data. A second, enlarged, edition is now in preparation and will be placed on sale to the public in 1959. Substantial progress has also been made in the preparation of a second edition of "Data Sheets on Moulding Sands," and with a further special publication summarizing and comparing British and foreign specifications for steel castings.

A new film, "Let's Clear the Air," has been completed during the year. It depicts the activities of the Association in carrying out surveys of atmospheric dust levels in the foundries of members, and reviews good and bad practices associated with dust control in steelfoundries. The Association's use of ciné film for research purposes, and as a means of communication of research results, was recognized by the Department of Scientific and Industrial Research, which accepted a paper from the Association

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at the conference on "The Use of Ciné Film in Industrial Research" in London on April 17 and 18, 1958, and which has nominated the director to take the chair at one of the sessions of the Harrogate Film Festival in April, 1959. The Association's film sequence showing convection currents and shrinkage phenomena during the solidification of a stearin wax ingot was accepted for showing at the British Association meeting in Glasgow in August, 1958.

Patents

The progress of several investigations during the last two years has enabled the Association to make application for several British Patents in recent months. One (No. 5725/59) is in respect of an exhausted fettling bench having special features to provide dust control and at the same time reduce noise levels; another (No. 11504/59) relates to a technique of steelmaking by means of which especially low sulphur levels may practicably be obtained.

It will be recalled that some two years ago the Steel Founders' Society of America assigned to the Association the right to apply for British Patents in respect of developments arising from SFSA-sponsored research on shell moulding. Two of the three Patent applications which were filed, relating to the addition of manganese-dioxide additions to shell-moulding mixes, and the use of forsterite and chromite in shell-moulding mixes, have been abandoned in the light of results from the Association's further investigations; but the third application (No. 1456/57), concerning the use of olivine in shell moulding, is being proceeded with.

Negotiations are in hand for the commercial exploitation of the Association's Patent (No. 774,147) covering the combined integral booth and exhaust system for swing-frame grinders.

The Association has filed opposition to the grant of British Patent Application No. 803,397, which deals with improvements in or relating to the production of casting moulds and casting cores (Dr. F. Raschig, GmbH).

External Relations

Liaison with the British Steel Founders' Association, whose chairman, Dr. Dadswell, is a member of the BSCRA Council, continues in a number of spheres. With the director's membership of their Industrial Health Committee and the common membership on the Councils of the two Associations, it was considered unnecessary to continue the life of the joint advisory committee on industrial health; but this will not affect the co-operation between the two organizations in this work. The contributions which each Association can make to a proper presentation of the industry's case with respect to the Clean Air Act has been recognized, and a joint approach was made to the Alkali Inspectorate by a delegation comprising the directors of the two Associations, Mr. R. F. Horton (chairman of the BSCRA plant engineering advisory committee) and Professor R. J. Sarjant (scientific adviser to the BSFA), at a meeting in February, 1959. Subsequently, the Alkali Inspectorate agreed to establish a working party on which Mr. H. W. Keeble (K. & L. Steelfounders & Engineers, Limited), Mr. W. Herring (Osborn Foundry & Engineering Company, Limited), the director BSCRA and Professor Sarjant will serve.

Discussions have taken place between the BSCRA and the BSFA, with a view to co-ordinating their activities, which are aimed at extending the markets for steel castings. Agreement has been reached for the establishment of a steel castings development committee to provide and disseminate data designed to promote the greater use of steel castings. The chairman of the committee will be nominated by the BSFA and the membership will comprise representatives of user interests in addition to steelfounders. The secretariat will be provided by BSCRA. BSFA have agreed to contribute the sum of £1,500 in the year ending March 31, 1960, to support additional investigational work by BSCRA in support of the committee's activities.

The Research Association gratefully acknowledges the assistance which it has received from the regional technical committee of the North-East Coast Association of Steel Founders in the conduct of an investigation aimed at elucidating the propensity to hot-tearing of CO_2-process moulding mixes. The Research Association has also been invited to participate in other BSFA regional technical committee activities, and has had the pleasure of welcoming visits from the Lancashire and Yorkshire Region and the Midland Region to the research station on February 25 and March 5, 1959.

The visit by Mr. Charles W. Briggs, technical and research director of the Steel Founders' Society of America, to the annual conference in October, 1958, provided further opportunity to strengthen the relationships between the Association and the Society. One direct outcome of the closer liaison is that the American Society no longer imposes a delay on their release to the Research Association of any of their research reports. Hitherto, the research reports that were regarded as having immediate practical application and commercial benefit were withheld from the BSCRA for a period of five years.

The investment-casting industry, having decided to establish a technical association, approached the BSCRA with a view to their providing a headquarters and secretarial services. Agreement was reached, and the secretary of the Research Association was appointed secretary of the British Investment Casters' Technical Association at their inaugural meeting on June 11, 1958.

Contact has also been established with the cast steel roll section of the Rollmakers' Association, and the BSCRA has provided library facilities for the Rollmakers' Association.

Information is also exchanged with several Research Associations, and specially valuable contacts with the British Iron & Steel Research Association and the British Cast Iron Research Association have been made and renewed during the year. The director has been elected to the

ing arrangement ucted for use the immersion ique of ultra-inspection of steel gs. The immer- nethod appears to omising in over- g the problems ated with rough t surfaces. This igation is pro- ıg under contract the Ministry of y.

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cil of the BISRA.

ween April 9 and 958, the director two steelfoun- and six research s in France, erland, Germany, nd and Belgium. research centres *Giesserei-Insti- Technische Hoch-*, Aachen; *Institut iessereitechnik*, Düsseldorf; *Staubforschungs- t*, Bonn; *Technische Hogeschool*, Delft; *linstituut T.N.O., Gieterijcentrum*, Delft, *entre Technique des Industries de la Fon-* Paris. It was discovered during these visits ome work at the *Giesserei-Institut*, Aachen, direct bearing on some of the Research iation's own investigations and a further was made there later by Mr. Middleton. n visits to the BSCRA have already been by Prof. Dr.-Ing. Wilhelm Patterson, *Gies- nstitut*, Aachen, Prof. Dr.phil. K. Löhberg, *it für Giessereitechnik*, Düsseldorf, and Prof. J. Zuithoff, *Technische Hogeschool*, Delft. substantial contribution to the activities of nstitute of British Foundrymen is made gh the Director's membership of their Coun- d Technical Council, and by staff appoint- to eight of their technical sub-committees.

Association was privileged to receive a visit HM Chief Inspector of Factories and senior ers of his staff on January 9, 1959, and was ed by the complimentary remarks of Mr. McCullough upon the extent and progress several investigations proceeding in the in- al health field.

Information and Advisory Services

use continues to be made of the library and nation service, and the service itself continues vide a complete coverage of the world litera- elating to steelfoundry and allied topics. The al growth in interest in Russian literature has reflected in the BSCRA library, and the on. acquisition and preparation of translations from the Russian and other languages is an ever-increasing activity. The Steel Founders' Society of America is now buying translations through the BSCRA library.

The number of technical inquiries, some of them involving a limited amount of laboratory work, reached the figure of 515 during the year. This represents an increase of approximately 70 per cent. as compared with the previous year.

Direct contacts with members also continue on an increasing scale. The number of visits by staff to members (110), and the number of visits by members to the research station (60), indicate that the value of direct personal contact is well understood and appreciated by the Association and a substantial number of the members.

RESEARCH

Substantial progress has been made with most of the projects which constituted the research programme for 1958-59. Consequent upon this progress, three projects are omitted from the programme for 1959-60 and are replaced by three new projects. A short account of the work conducted during the past year is presented below.

Steelmaking

Oxygen Injection

Oxygen Injection for Carbon Removal: Control charts and tables have been constructed which can be applied to the production of plain carbon steel melts, to determine the value of oxygen required to be injected to give a required carbon removal from a predetermined carbon level at temperatures prior to injection of 1,500, 1,550 and 1,600 deg. C. The

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use of these charts should lead to economies in the use of oxygen since (*a*) the volume of oxygen required is known, and (*b*) the necessity of blowing until the carbon flame drops is obviated. This means that blowing can be terminated at a higher carbon level where necessary, thereby also economizing in pig-iron or other recarburizing materials.

Foundry trials using these control charts have been conducted by six members of the Association's steelmaking advisory committee, and results in agreement with predictions have been obtained in furnaces of up to 10-tons capacity.

Injection of Oxygen/Air Mixtures: Work has been carried out on the dilution of oxygen with air in order to determine the effect on carbon and metalloid removal, and hence to determine whether economies in the use of oxygen can be effected. The results obtained show (i) that the increased agitation caused by the ballast nitrogen does not increase the efficiency of carbon removal, and (ii) that the cooling effect of the ballast nitrogen allows the manganese content to be reduced to less than that obtained in normal oxygen practice. This technique may have an application in the production of low-manganese steel castings for the electrical industry. Analyses show that the nitrogen pick-up during oxygen/air injection is not serious, being only of the order of 0.0004 per cent. from the beginning to the end of the blow.

Phosphorus removal during Oxygen Injection: Preliminary work has shown that phosphorus could be removed from initial levels of approximately 0.1-per cent. P before O_2 injection, to a level of well below 0.02-per cent. P after injection, by the simple expedient of commencing the injection of oxygen at low metal-temperatures (1,500 deg. C.) and adding limestone during the blow, thus minimizing the temperature increment and maintaining a highly basic slag. Unfortunately, even though extreme care was taken during slagging off, reversion of phosphorus occurred during the reducing period, so that final phosphorus in the castings was of the order of 0.03 per cent. Further work is in hand on this technique, with the object of minimizing phosphorus reversion.

Fume Generation: A study has been made of the effect of foundry steelmaking variables on the generation of fume during oxygen injection. Two practical points have emerged:

(1) that for a given oxygen-input rate the amount of fume increases with increasing mean carbon content (*i.e.*, the average of the initial and final carbon contents).

(2) that for a fixed mean carbon level the amount of fume increases as the oxygen-flow rate increases.

By sampling the fume simultaneously at different levels within the furnace and in the duct above the furnace door, it has been found that a major portion of the samples collected within the furnace consisted of elemental iron, whilst that collected in the duct was mainly iron oxide. This seems to indicate that the fume, when first formed, consists of elemental iron.

Reduction of Refining Slags

One of the objects of this project is to minimize the gas content of molten steel, when tapped, by minimizing the time from the end of the carbon boil to the time of tapping. This has been taken to the extreme in several heats made by a complete reversal of the customary practice, in that the steel charge was melted out under a reducing (falling) slag which was later removed and replaced by an oxidizing slag. Oxygen was injected to effect carbon removal, the oxidizing slag pulled off, and the heat finished as rapidly as possible with only a thin protective reducing slag cover. It has been found possible by this method to obtain sulphur contents in the castings of less than 0.01 per cent., since a longer time under reducing conditions was feasible without irremovable gas pick-up. Encouraging results have already been obtained from further work aimed at reducing the duration of the reducing period.

Foundry Processes and Moulding Materials

Factors affecting the Surface Quality of Steel Castings

Mould Paints and Washes: Preliminary investigations have been concerned with the room-temperature properties of zircon and silica mould paints, *viz.*, the suspending power of the medium, the viscosity and specific gravity of the paint, the friability of the dried film and the factors responsible for the formation of cracks on drying.

A variety of suspending agents has been examined, and viscosity measurements have been made on a series of paints and related to such variables as specific gravity, percentage suspending agent and the thickness of the paint film when applied to the sand surface in a standard manner.

The susceptibility of the applied paint film to crack during drying has also been investigated. This cracking is due to shrinkage of the paint film, and may arise from either an excess of clay or binder in the paint, or from poor packing of the refractory. The friability of paint films has been measured by a simple abrading test, and the stability of various paints at different drying temperatures determined.

High-temperature tests are now in progress, and dip and casting tests have yielded some information on the behaviour of mould paints of various compositions when in contact with molten steel. A test casting has been designed in which different ferro-static heads can be simulated by the application of air pressures to the solidifying casting.

Factors affecting the Erosion of Moulds by Molten Steel: A satisfactory test-casting has been developed which shows erosion effects and gives reproducible results. A study has been made of the erosion of a thin vertical plate by a downward stream of metal. The sides of the plate are formed by two cores of the sand under test pressed to a predetermined density. Tests carried out on green- and dry-sand compacts of various densities, bonded with a Wyoming bentonite, indicate:

(1) With low densities erosion is severe, and this becomes less as the density of the compact increases. At a certain optimum density, however,

tus for the accurate determination
green strength and deformation of
nixes. It was designed and con-
at the research station because the
ional apparatus was not sensitive
for the low green strengths to be
ed. It is widely used in testing the
properties of cereal binders.

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er increase in density causes expan-
abs to occur, and the higher the
above this optimum, the greater is
ree of scabbing.

The optimum specific gravity of
ted sand to prevent scabbing and
e best resistance to erosion is 1.59
-sands and 1.54 for green-sands.
re, a dry-sand may be rammed
than a green-sand without scabbing,
resulting improvement in resistance
on. These tests have been repeated
calcium bentonite as the bond, and
lts indicate that a combination of
g and erosion may occur which is
evere than was obtained with the
g (sodium) bentonite bond.

ility of Green-sand Moulding-
n Air Drying: Apparatus has been
ted for measuring the friability of
nd moulding-mixes. A standard
n is revolved beneath a falling
of metal shot, and the loss in weight
sand specimen caused by the abra-
the shot is used as a measure of the fria-
f the sand. Initial work was concerned
ermining the optimum conditions of height
ight of the falling shot, and speed of
of the specimen. Tests on normal green-
ecimens show that there is an optimum
e content below which the sand becomes
able. This optimum moisture content is
milar to that which gives the optimum
rength, and for bentonite-bonded sands is
2 to 3 per cent. The effect of different
e contents at varying moisture contents
n determined, and work is now proceeding
rmine the friability of sands of various
tions, when allowed to air dry for different

lium-silicate Process

on the collapsibility of CO_2/sodium-
mixes by hot-tear tests has continued in
ation with the North-East Coast Associa-
Steel Founders regional technical com-
A satisfactory hot-tear test-casting has
veloped, and has proved to be reproducible
sitive to variations in the moulding mate-
nder these conditions, it has been found
propensity towards tearing is no greater
O_2-process sands than with normal dry-
ixes, and that, of the different mixes
d, tearing was most severe with oil-sands
t with green-sand mixes. The addition of
organic materials, *e.g.*, cereals, molasses, etc., to CO_2 sands increased the severity of tearing, whereas small additions of clay reduced, or prevented, tearing.

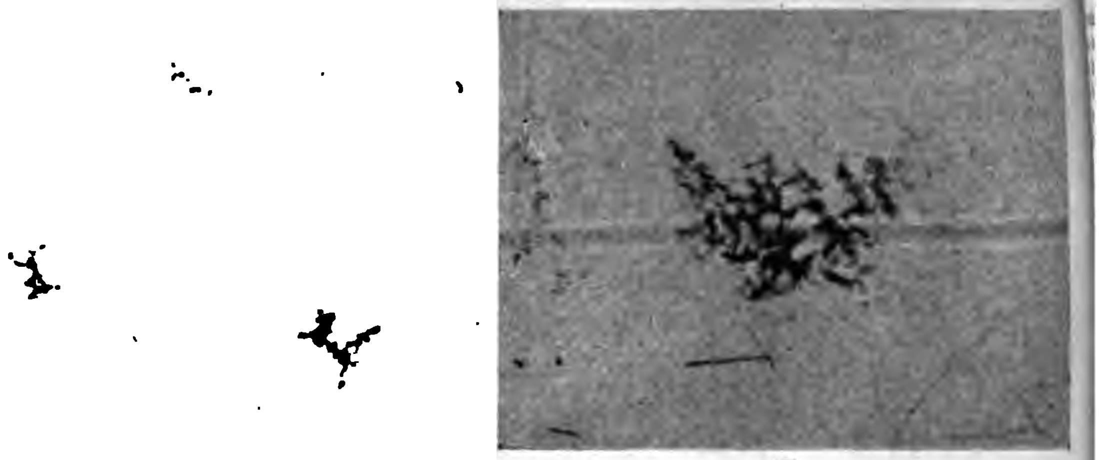
Work has also continued to assess the effect of additives, such as clays, sodium hydroxide, etc., upon the room- and high-temperature properties of sodium-silicate/CO_2 mixes. It has been shown that, whilst clay additions lower the air-setting strengths of sodium-silicate mixes after gassing, they improve the initial green-strengths and lower the retained strengths of the mixes after heating within the range 700 to 1,100 deg. C. The retained strengths after heating within this range are closely related to the knock-out properties of the sand after casting.

Kaolinitic Clays

Several member-foundries have been supplied with experimental batches of the mixed bentonite/ball-clay binder formulated by the Association, and have expressed satisfaction with the behaviour of the clay. These foundries are now using kaolinitic/bentonite mixtures of their own under foundry production conditions. The foundry first engaged on the trials with the clay mixture has now been using it for almost three years with satisfactory results.

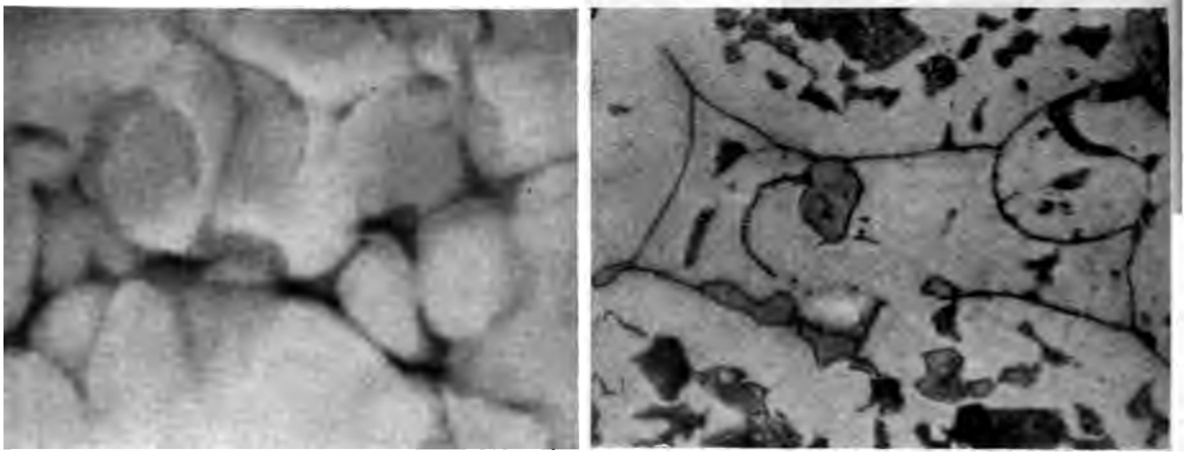
Data Sheets on Moulding Sands

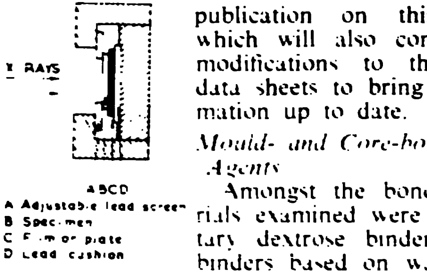
Data sheets on a further 15 sands have been completed. These will be issued together in a new


(*a*) (*b*)

For the detection of microporosity or other small defects, a technique developed at BSCRA involves preparation of a thin slice of metal approx. 0.020 *in. thick, by surface grinding. The specimen is radiographed with X-rays from a crystallographic X-ray tube as shown in the sketch below (col. one). Typical microshrinkage areas are illustrated in (a) and (b), at magnifications of* × 12, *and* × 20, *respectively. The use of a maximum-resolution plate permits examination of the radiograph at high magnifications. A defect* × 150 *is shown in (c), with a photograph of the same area at* × 150 *in (d).*

(*c*) (*d*)





edition of the Association's publication on this subject, which will also contain some modifications to the existing data sheets to bring the information up to date.

Mould- and Core-bonding Agents

Amongst the bonding materials examined were a proprietary dextrose binder and two binders based on water-soluble cellulose ethers. The dextrose binder showed some advantages over normal binders for core purposes, e.g. quicker drying and faster collapsibility, while the cellulose binders were generally inferior in properties to the more conventional cereal and oil binders. In view of the current interest in air-setting oil binders for cores and moulds, a survey has been made amongst the foundries using these materials. Further work on four oils available in this country is proceeding in the laboratory, and this includes testing properties such as tolerances to moisture and clay, and the bench life of the mixes.

Flowability of Moulding Sands

Work at BSCRA Laboratories: Some compaction tests have been made with various sand mixes using a jolt-squeeze moulding machine under standard conditions. These showed that increasing the moisture content of a bentonite sand mix from 2.25 to 5.6 per cent., whilst having little effect

uld hardness, caused a marked increase
bulk density of the mould. Other findings
at the green compressive strength of the
d little effect on compaction properties,
t generally sands containing kaolinitic clays
d harder than did sands containing benton-
he problem of flowability is also being in-
ted by studying the effects of grain size and
ze distribution of the sand.

k *at Sheffield University:* The object of
nvestigations is to throw light on the in-
of the bond on the compactibility of the
ng sands. For this purpose the flow
ies of clay-water mixtures at the consis-
at which they occur in the sand are being
gated. Following preliminary work with a
y-type viscometer, a shearing-plate visco-
has been constructed. In this apparatus the
ter mixture is sheared between two parallel
s-steel plates, the relative movement of the
being recorded electronically, using a
c-strain recorder. This apparatus is very
e, and is capable of measuring very small
at strain rates of up to 100 mm./mm./sec.
down to 0.1 mm. in thickness. The results
hat, at all moisture contents in the work-
nge, a rapid deformation occurs when the
first applied, this being followed by a
deformation when the load is maintained.
nount of strain occurring during the first
nd the rate of strain to the point of rupture,
crease as the stress increases, and as the
e content increases at constant stress. So
the results have been obtained under con-
of constant stress, but the apparatus has
een modified to permit the behaviour of
y to be observed at a constant rate of strain-
reliminary work with the modified appara-
shown that films of a ball clay become
ingly brittle as the rate of straining in-
. It is believed that this method of investi-
will give a better insight into the behaviour
clay bond under conditions of jolt ramming.

Metallurgy

orosity in Steel Castings

ress with microporosity in steel castings has
reatly enhanced by the development of a
ue which has been called semi-micro-
aphy. This involves the use of specimens
to 0.020-in. thickness or less—with high-
on plates, X-radiographs are produced
reveal micro-defects with good definition at
ications of the order of 20 to 30 times
cing page). The semi-microradiographs are
d by using a counting technique, and by this
any particular area of a casting may be
atively assessed for its microporosity con-
By this method it has been confirmed that
s a close quantitative correlation between
orosity and ductility.

s been shown that the ductility of similar
of cast steel containing equal amounts of
orosity could be improved by heat-treat-
Pressure tests have also revealed that, for
sections of 0.030-in. thickness, the micro-cavities can be continuous and inter-connected.

Investigations on the effect of pouring temperature and composition have been commenced, and a number of castings have been made using compressed-air feeder-heads. Semi-microradiographic and tensile-test results so far obtained have indicated that pressure feeding has not improved soundness and mechanical properties.

Magnetic Properties of Cast Steel

Work has continued to determine the effect of residual elements on the magnetic properties of high-permeability steel castings. This work has confirmed the importance of controlling the content of residual elements, but further work has been suspended until vacuum-melting facilities are available to facilitate control of the many variables that are important.

Influence of Rare Earth Additions and Complex Deoxidants on the Properties of Cast Steel

Low-temperature impact properties and room-temperature tensile properties have been measured on steels which had been deoxidized in the ladle by a variety of different treatments. The steels employed were medium-carbon and pearlite-manganese types, which were cast into keel and clover-leaf test-blocks. The results obtained have been somewhat inconclusive, due to the difficulty of controlling all the minor variables in steel made by normal commercial processes. This subject will be re-opened when facilities for vacuum melting become available.

Heat-treatment of Steel Castings

The object of this investigation is to determine the influence of heat-treatment on the mechanical properties of castings of different masses, in order to find whether or not heat-treatment cycles can be shortened. Preliminary work was concerned with the development of suitable test-castings of 1-in., 3-in. and 5-in. sections, and the determination of heating rates and thermal gradients within the blocks and the heating furnaces used. Experimental heat-treatments have been applied to a 0.3 per cent. carbon steel heated at various temperatures related to the Ac_3 temperature, and cooled at different rates with and without subsequent tempering. The results indicate that the rule " 1 hr. per inch of section " should not be applied without regard to the temperature used and subsequent rate of cooling, and more exact relationships will be established as the result of further work now in hand.

Surface Inclusions in Steel Castings

Work has been carried out with the co-operation of AERE, Harwell, with the object of finding a suitable method of radio-actively labelling sand so that mould erosion may be studied. This has now been achieved and foundry trials are at present being planned.

Relation of Crystal Orientation to the Results of Impact and Bend Tests

The purpose of this project is to examine, in plain carbon and 18/8-type stainless-steels, the effect of both dendritic formation and preferred crystal orientation on impact and bend properties. Preliminary work has been directed at designing a test-block casting containing columnar crystal zones large enough to permit the preparation of mechanical test-pieces from them. A horizontally-cast 3-in. square block, chilled over the entire top face, has been found satisfactory. A number of these blocks have been made in 0.3 per cent. carbon steel, and tests are now in progress.

Physical Data on Cast Steels

A summary on physical and mechanical properties of the commonly used carbon, low-, medium- and high-alloy steels has been made with the co-operation of several member firms. Physical data are largely lacking on plain carbon, low- and medium-alloy cast steels. Preparations are therefore being made for the experimental determination of several physical constants for a range of steels in this category. Arrangements are also being made for tensile tests to be done on test-pieces machined to the various proportional systems, to enable empirical relationships to be established between the percentage-elongation values obtained from cast steels tested in accordance with these various systems.

Intergranular Fracture in Steel Castings: Work at Sheffield University, under the direction of Dr. R. G. Ward, was commenced in October, 1958.

Plant Engineering

Sand Reclamation

The Association has carried out trials on the following methods of sand reclamation: a dry pneumatic scrubbing unit; a pilot-scale log washing plant; two types of wet scrubber. Wet-scrubbing methods have considerable promise, and it has been shown that it is possible to reduce the clay content of used sand to a level approximately equivalent to that of new silica sand, and to use this sand satisfactorily for facing sand and for core production. This has been substantiated by foundry trials. In addition, the Association has built a small experimental unit which it is hoped will enable a more satisfactory technique for dry reclamation to be evolved.

Moulding-sand Compaction and Moulding Machines

An extensive investigation has been made into the degree of compaction of moulding sand at various points on a standard pattern in relation to a range of sqeeze pressures, jolt stroke and time, and with sands with various green strengths. This has led to a definition of the optimum conditions of machine operation, and these results have been confirmed on moulding sands prepared in production mills in two member firms. Tests are also being carried out on the effect of squeeze pressures exceeding the pressures available on the jolt-squeeze moulding machines.

Efficiency of Shot-blasting

Examination of the physical properties of 30 samples of abrasives has been completed. A test*ing machine* has been made which is designed to compare, for various abrasives, the cleaning efficiencies, rates of breakdown and wear on machine parts. Tests of the abrasive samples in the machine are now proceeding and the results of these are to be compared with the physical properties to assess which of the latter give the best indication of the "quality" of the abrasive. A comparison is also being made, simultaneously with the examination of the abrasives, of the rates of wear of throwing-wheel blades and wear plates used in the machine, which are made from different wear-resistant alloys.

Chemical Methods of Cleaning Castings

Three proprietary processes of chemical cleaning have been investigated. From the tests carried out, it can be confirmed that all three processes are capable of removing adhering sand. In the case of sand penetrated with metal, the process of sand removal is very slow as the reacting liquids have to penetrate between the probes of metal. The surface of the casting remains rough and still requires dressing.

Industrial Health

Atmospheric Dust in Steelfoundries

The results of the survey, completed in 1957, of atmospheric dust in the dressing shops of 58 member firms have been carefully examined, and correlation between dust concentration and work load, shop volume and ventilation has been sought. Bulk airborne-dust samples of every fettling-shop process have been collected, in order to determine their characteristics and their contribution to the overall dust concentration in foundries. The development of a magnetic-separation technique has permitted a closer investigation of the non-magnetic fraction of foundry-dust samples, without the masking effect of a high percentage of iron oxide.

Efficiency of Dust Collectors

The first issue of "Data Sheets on Dust Collectors" has been received very favourably by member firms. Further sheets are being added and, when an expanded issue is ready, it is intended to give this publication a much wider circulation. Tests have been completed on a new type of air filter from South Africa, and the isokinetic sampling of dust in ducts has been standardized. Considerable experience has been gained in sampling and determining the particle-size distribution of such dust by sedimentation methods.

Dust Control on Portable Fettling Tools

An assessment has been made, and a statement published to members, regarding the usefulness of the low-volume high-velocity system for controlling dust on portable fettling tools. A film has been made illustrating this study, and a copy supplied to the manufacturers of this system. An exhausted fettling bench incorporating features of both noise and dust control, which has been built at the research station, showed a satisfactory dust control. This bench has been installed in the fettling shop of a member foundry, and has performed satisfactorily under production conditions. Another prototype bench, of a circular form, which it is thought should have practical advantages, has also been constructed and tested in the research station.

Noise Abatement in Foundries

Pending the building of a demonstration booth incorporating the principles of noise abatement, a number of general recommendations have been prepared and issued. It is hoped that these recommendations will enable members to take simple and effective steps to control noise levels, and prevent financial wastage due to the building of unsuitable structures.

Silicosis Hazards in Steelfoundries

Animal experiments have continued at Reading University (sponsored jointly by the Association and Imperial Chemical Industries, Limited) to determine the relative toxicity of dust from normal synthetic moulding-sand and CO_2/silicate-process sand. It is anticipated that a definitive stage in this work will be reached during the coming year.

Operational Research

One of the Association's senior investigators has attended a course in work study organized by the operational research unit of DSIR. He was subsequently attached to the DSIR unit for a further period to acquire experience in this field. With the ready co-operation of a member-firm, a study was made of the operation of a steelfoundry core-shop. The study was of one week's duration, and was carried out by two members of the DSIR unit assisted by the member of BSCRA staff referred to above. The results of this study were incorporated in a report (published in summary form in *Journal* No. 44, December, 1958), which recommended changes in layout of the core-shop to facilitate production. The member firm has expressed appreciation of this pilot exercise.

* * *

The Report is signed by Mr. C. H. Kain (chairman) and Dr. A. H. Sully (director of research).

British Exhibition in USA

With the purpose of publicizing the British way of life and boosting British industry throughout the North American continent, plans on an elaborate scale are being made for the British Exhibition and Trade Fair to be held in June next year at the Coliseum Exhibition Building, New York, USA. Organized by British Overseas Fairs, Limited, the Exhibition has the backing of the British Government, the Dollar Exports Council, the Federation of British Industries and the British-American Chamber of Commerce in New York.

The Government is spending £100,000 on its exhibit, which will occupy the whole of the first floor of the building. Companies in the motor-car industry have booked a section comprising over 7,000 sq. ft., for the showing of one model from each range of cars selling in the American market. Other motor-transport companies will be participating as will also many well-known British heavy- and light-engineering firms.

Space rates are being kept as low as possible, exhibitors being charged only about half the actual cost of the Exhibition; it is expected that the other half will be recouped from gate receipts.

Bolton Diploma Course ?

Bolton Technical College, Manchester Road, Bolton, Lancs, has recently extended its patternmaking and foundry classes to meet an increasing demand for better-trained personnel to service the industry. It is true to state that of the existing arts and crafts still being practised in modern industry, the heaviest concentration is in the foundry, and exhibited by the moulder and patternmaker.

The progress of the courses in foundry practice at the Bolton College during the past six years has been truly heartening, as all sections of the industry have co-operated, the employers having been particularly generous, whilst in the background the College authorities have financed, perfected, and made the various schemes and projects possible, with the result that *wastage of students has been cut to a minimum.* In the final City and Guilds examinations over 90 per cent. of the students presented have been successful.

The courses have always been realistic and sight has not been lost of the main aim of the foundry industry, "the production of a good casting more cheaply and quickly than anyone else." To this end, the College staff has been carefully selected to give a balance of practical, technical and theoretical experience, against a background of years of responsibility in the industry itself. The workshops and laboratories are well equipped and planned, and in their use, foundry problems involving sands, metals, testings and so on are thoroughly investigated.

New Scheme

Having received generous support by the industry and by interested foundrymen, the Bolton Educational Authority has now presented a scheme, sanctioned by the Ministry, and supported by regional industry, for a sandwich course in foundry techniques and technology, leading to a recognized foundry diploma over and above existing qualifications. This has meant the reorganization, re-equipping and extension of existing foundry workshops and laboratories so that it is claimed "the College foundry, when completed, will be the most modern and best equipped in the country for experimental and production purposes." In the laboratories, physical, microscopic and chemical equipment will be in constant use. The ancillary subjects are dealt with and production, organization, management, commercial English, mathematics and statistics have been catered for in a realistic and well-formulated syllabus including works visits.

Other Facilities

While the diploma sandwich course is of great interest and importance, facilities are being extended for the normal four-year courses in foundry and patternwork for part-time day-release students. Existing foundry requirements have not been overlooked and a series of post-advanced lectures in the form of two short courses have again been arranged for responsible foundry personnel. The lectures will be given by specialists who are recognized authorities in their own field, and the courses will take place on Wednesday afternoons at 2.0 p.m.; firms are invited to nominate staff to attend. Similar courses last year were well attended and provided an impetus to more mature persons in the industry.

These studies are under the direct supervision of Mr. A. E. Bell, head of the mechanical engineering department, from whom further relevant information can be obtained.

New works for Ashmore, Benson, Pease & Company

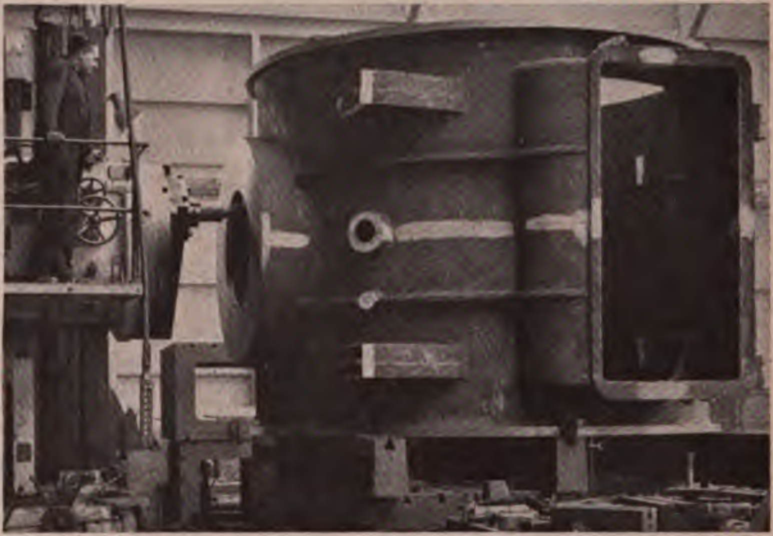
The Parkfield Works site at Stockton-on-Tees has been used by Ashmore, Benson, Pease & Company, for more than eighty years as an engineering works. From time to time the works were extended and buildings added until, in 1948, it was seen that any further extensions would inevitably result in loss of efficiency due to congestion. It was also apparent that both the size and layout of the shops were more suitable for the products turned out by the company in the earlier part of the century than for the heavier and more complicated plants produced to meet the present-day needs of industry. In January 1949, therefore, a decision was taken to rebuild the works progressively over a period of years on a new site, which is now known as the "South Works." A description of this site is given below.

In January, 1949, the directors of Ashmore, Benson, Pease & Company, Limited were faced with the question as to what their customers would need in ten or twenty years' time—an answer to this question would have given valuable guidance in the planning of the projected new works. However, the fact that technical progress was moving at phenomenal pace meant that it was quite impossible to forecast developments even for a few years hence—let alone for two or three decades ahead. Fortunately, past experience furnished certain basic principles, and these proved immensely valuable in laying plans.

Basic Principles

It was regarded as certain that the company's products would become larger in the years ahead, and that they would be produced from materials yet to be developed to closer tolerances and higher standards of quality. There was no doubt therefore that any new works must be planned on a far larger scale than any envisaged before, and that ample accommodation must be provided for a first-class team of engineers and technologists. From this reasoning emerged the broad principles behind the layout of the new works. The decision was made to provide each production department with twice the existing floor area which it then occupied, with room for redoubling in a logical manner in the years ahead. Similarly, room was to be allowed for the quadrupling of office accommodation. Above all, flexibility was to be the keynote of the new

Miscellaneous castings in the new machine-shop at the South Works of Ashmore, Benson, Pease & Company.



er views of the new : (above) a drop-hammer g marked ready for the ine-shop; (top right) the high bay of the construc- shop. and (right) work in ess on a 13½-ton evapora- casting in the heavy ne-bay.

, in order to be ready for any developments ture might hold.

First Stages

implement this decision a site of 125 acres ecured, about half-a-mile south of Parkfield . Then, after the overall layout of the factory een decided, the detailed planning of the wise construction adopted began. The first of the new constructional shop consisted of 0 sq. ft. of covered floor area with ancillary es and buildings—this came into production summer of 1951, since which time the shop en further extended to give a total floor area ,000 sq. ft. The next stage of extension con- of building a structural bay, adjacent to the uctional department, which added 27,200 to the shop and provided much improved es for the fabrication of structural steelwork, as distinct from the manipulation of plate in the main constructional shop.

Subsequent Work

The most recent step in the development has been the completion of the machine- and fitting-shops under one roof, and the provision of a working area of 160,200 sq. ft. This part of the programme has been concluded only as recently as June 1959, with the installation of the latest of the new heavy machines. To date about £3,000,000 has been spent on the new works, though only a small proportion of the 120-acre site has yet been used.

Encouraging Results

In the ten years since the original plans were drawn up many radical and rewarding changes have been noted. For instance, the company's turnover has been quadrupled, while its staff has doubled.

New Works for Ashmore, Benson, Pease

The weight of the biggest job produced has trebled, and many materials have been used which had not yet been developed during the planning days of 1948. There is abundant proof that the original plans were well founded, and plenty of room for further progress in the years that lie ahead. The general foundry is still at the Parkfield Works (this was described briefly in the JOURNAL of June 11, 1959, when reviewing establishments to be visited by IBF Conference parties).

* * *

(The principal products of the works division of Ashmore, Benson, Pease & Company, Limited include all types of heavy industrial plant and machinery, particularly that used in the iron and steel, chemical, gas and petroleum industries. All classes of pressure vessels to B.S.S.1500, A.S.M.E., A.O.T.C., Lloyd's Class I and II, and U.K.E.A.E. specifications are produced, and other design codes fabricated from mild or stainless-steel, nickel, Monel, Inconel or clad materials. Braun heat-exchangers and heavy high-quality welded fabrications are also made. The maximum weight of work that can be manufactured complete is limited mainly by transport considerations to about 100 tons, although equipment in excess of this weight can be produced in special circumstances.)

IBF Golf Meeting

As fine weather usually attends the annual competitions of the Golfing Society of the Institute of British Foundrymen at Woodhall Spa, this year's meeting in the same venue was no exception. About 40 members attended, most of them accompanied by their ladies, the meeting occupying the weekend commencing Friday evening, September 25, until Sunday afternoon. Despite the dryness, the course was in quite good condition and excellent scores were recorded in the various events, a record low net figure for the Society being returned for the Medal Round on Saturday morning.

The various results are recorded in what follows:—
Saturday morning: Stroke competition for the IBF handicap and Scratch Cup (34 competitors).

1.	R. Plant	92 – 26 = 66	Winner Handicap Cup.
2.	C. T. Sandford	98 – 24 = 74	
3.	C. S. Bosworth	90 – 15 = 75	(best over last 12 holes).
4.	H. H. White	82 – 7 = 75	Winner, Veterans Prize.
5.	J. G. Phillips	81 – 5 = 76	Winner, Scratch Cup.
6.	W. E. Aske	94 – 17 = 77	
7.	E. Clipson	94 – 17 = 77	
8.	D. Killingworth	97 – 19 = 78	
9.	V. Brackenbury	95 – 17 = 78	
10.	J. Bell	93 – 14 = 79	
11.	P. B. Higgins	85 – 6 = 79	
12.	E. W. Pugh	91 – 11 = 80	
13.	E. Jarvis	103 – 23 = 80	
14.	J. Moran	107 – 25 = 82	
15.	R. C. Shepherd	95 – 13 = 82	

Mr. Plant and Mr. Phillips, in addition to holding the Cups for one year, also received a silver tankard each, this year donated by FOUNDRY TRADE JOURNAL, through Mr. V. C. Faulkner, one of the vice-presidents of the Society. The Veteran Cup winner also received a tankard, presented by Mr. W. E. Aske. The IBF Coronation Shield (held for one year) was awarded to the Lincolnshire branch—for the first time, despite the fact that the teams were "playing at home." The three Lincolnshire representatives on this occasion were Mr. C. S. Bosworth, 75, Mr. E. Clipson, 77 (and Mr. D. Killingworth, 78).

Saturday afternoon: Two-ball foursome against bogey.

1.	C. T. Sandford and C. S. Bosworth	2 up
2.	P. G. Pennington and D. Killingworth	All square
3.	R. T. Turner and W. H. Richards	1 down
4.	E. W. Pugh and C. A. Anderson	2 down
5.	T. Reynolds and E. C. Carrott	2 down
6.	Dr. A. H. Sully and J. C. Howard	3 down

The winners each received a chromium-plated "Lincoln Imp" (together with a citation of its potency as a "charm") and a prize of golf balls in addition.
Sunday morning: Stableford fourballs (three-quarter handicap).

1.	W. H. Richards and E. W. Pugh	44 points
2.	P. G. Pennington and J. G. Phillips	42 points (decided on holes 10-18)
3.	P. B. Higgins and G. W. Nicholls	42 points
4.	T. Reynolds and J. C. Howard	42 points
5.	J. Bell and E. Jarvis	42 points

The winners each received six golf balls as prizes.

Ladies' Competition (Saturday)

The Coronation Rose Bowl Competition attracted 12 competitors, the winner being Mrs. R. T. Turner with 37 points, and the score cards as follow:

1.	Mrs. R. T. Turner	37 points
2.	Mrs. V. Brackenbury	29 points

In addition to holding the Rose Bowl for one year, the winner was also given a "Lincoln Imp," presented by the Lincolnshire branch. Both first and second competitors received a prize of golf balls. To encourage the ladies to participate again, each of the non-winners was given a golf ball as a consolation prize.

Annual General Meeting

The chair at the annual meeting—which was held on the Saturday evening in the Golf Hotel—was taken by the president of the Society, Mr. J. Bell, who after welcoming members asked them first to stand in remembrance of Mr. Arthur Swain, an early and enthusiastic member of the Society who had died during the year. After apologies for absence had been read, Mr. R. C. Shepherd proposed that life membership of the IBF Golfing Society should be open to old members of the Society irrespective of whether or not they continued to be members of the Institute of British Foundrymen, and this measure was accepted by a unanimous vote.

In elections for office, Mr. J. Bell was again chosen as president on the proposition of Mr. E. A. Phillips, seconded by Mr. F. Webster; Mr. J. G. Phillips was re-elected as secretary; the vice-presidents and committee were re-elected *en bloc* with the addition of Mr. E. W. Pugh and Mr. P. B. Higgins to the latter. For next year's meeting, it was decided again to patronize Woodhall Spa, there being no other proposition put forward—this in part recognition of the excellent facilities provided by both the Golf Club and the Golf Hotel. The date of next year's meeting it was left to the committee to decide.

At this juncture, the prizes were presented by the president to the winners in the various competitions, and the meeting concluded by an expression of gratitude to the secretary, voiced on behalf of the assembly by Mr. Bell.

Annual Dinner

Following the annual general meeting, members and ladies reassembled for the annual dinner of the Society, followed by dancing, both held in the ballroom of the hotel. The proceedings were completely informal and there were no speeches. It was surprising to find that despite the strenuous exercise provided by 36 holes of golf earlier in the day, members found sufficient energy to really participate fully in the dancing and a good time was had by all.

tics Patterns

National Society of Master Patternmakers discuss Potentialities

t 40 members of the National Society of Patternmakers and guests were present at Cross Hotel on Tuesday, September 22, to paper " Introduction to Patternmaking in "* given by Mr. H. G. C. King, of the ocomotive works of British Railways. The was under the chairmanship of Mr. B. Levy ovided tea before the meeting began), sup- y Mr. W. D. Hartley, the president of the

se of epoxy resins for the manufacture of patterns has been developed during the years in the British Railways locomotive atternshop at Crewe, and Mr. King's paper ed on the experience and results obtained. ntroduction to his talk, Mr. King said that of plastics had increased with such out- success in both the patternshop and the s at Crewe that patternmaking in plastics a recognized method of manufacture. As of the research carried out into the use of terial, there were now over 1,000 plastic in use on moulding machines of various d he hoped that his talk that evening would the advantages that had been found to rom this comparatively new practice.

Materials and Equipment

ing then enumerated materials and equip- uired for the manufacture of this type of saying that these were inexpensive and btainable. A standard plastics casting-mix l, he said, of three main ingredients—epoxy ller, and hardening agent. In addition, f the following would be needed: thixo- gent, fibreglass fabric, vermiculite and cork, sealing lacquer and release agent. Miscel- equipment needed to operate the process : paint brushes from ½- to 1-in. in width, oller (4-in. long by 1-in. dia. for use in ating the fibreglass), 3-in. palette knife, thermometer, modelling clay, cellophane, gloves, barrier cream (ordinary barrier re unsuitable, but several firms manufac- ial resin-resisting creams), solvents (acetone hylated spirits), clean rag and cotton waste. aterials would cover the manufacture of of pattern, from the solid casting of small to large patterns made by lamination.

s the most expensive item of equip- ommended was an oven and suitable heat- ent, but, for a normal range of patterns, ld be of simple design in the form of a binet, say, 4-ft. long by 2 ft. 6-in. wide . 6-in. deep, with adjustable shelves, and a lement built into the base. Scales to weigh up to 14 lb. were also needed, as also metal drums (with taps) for the storage ner and resin. In addition, Mr. King recommended the use of ordinary ¼-, ½- and 1-gall. tins as mixing vessels.

Itemized Procedure

The lecturer then went on to describe the preparation of master patterns and followed with the production of moulds. Regarding the former, he said that split patterns of the type readily assembled to plates for machine moulding were particularly adaptable to manufacture in plastic. The master pattern could be of simple construction as it was fixed to a board during use. For example, the body, flange, and prints of the pipe patterns could be made separately and screwed together, which was simpler than the normal jointing adopted for a standard production type of pattern.

Passing on to details in the production of epoxy-resin duplicates from the master patterns, Mr. King said it was first necessary to prepare a plaster mould. In this, the face of the pattern which would be in contact with the moulding-machine plate was cast uppermost, and this needed to be thickened by ⅛ in. This was to provide sufficient material for machining, which was essential in order to ensure dimensional accuracy, and also to remove air bubbles from the plastic mix which would rise to the top face of the cast. To prepare it for investment in this plaster, the master pattern should be well coated with pattern enamel and then screwed to a board of ½-in. thick plywood, then a wooden frame built around it, a minimum space of ½ in. being left between the pattern and the frame. The next step was to coat the surface of the pattern and board with a creamed wax-polish to facilitate easy release from the plaster. The quantity of plaster required for a particular mould could be estimated by weighing the amount of water the frame would hold and using 75 per cent. of this amount. The addition of 1 lb. plaster to each 1 lb. water would be found to be sufficient to fill the mould and give a fairly thin pourable mix. After pouring the plaster into the mould, it should be vibrated to bring air bubbles to the surface. When the plaster was firm, surplus could be removed from the top of the frame and the complete mould turned over to stand on this face. The pattern, still secured to the board, could then be withdrawn.

Passing on to the final operation in the preparation of the mould to receive resin, Mr. King said this stage was most important. It was necessary to seal the surface of the plaster which would come into contact with the plastic material, and apply a release agent. Several coats of sealing lacquer were recommended and these could be applied by brush, allowing 30 min. for each to dry. Mr. King emphasized the importance of the thorough application of the sealing lacquer; unless this sealing was complete, plaster would adhere to the plastic cast and its removal would be a long and tedious job. A well-sealed mould would possess a glossy surface and should any dull patches be evident, a further covering of lacquer should be applied.

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lly presented to the Institute of British Foundrymen.

Plastics Patterns

Finally, one coat of a creamed wax-polish should be applied over this sealed surface to form a release agent, and then the mould would be ready for use. During his lecture, Mr. King showed 25 slides to illustrate the manner of preparation of master patterns and the production of moulds, and he had also brought along about a dozen patterns of varying degrees of complexity, for members of his audience to examine.

At the end of Mr. King's talk, Mr. Levy introduced Mr. Hartley to members, and the president said a few words about the constitution and aims of the National Society of Master Patternmakers, commending Mr. Levy in getting together at that meeting such a representative gathering of London-area firms. Mr. Hartley appealed for new members and asked all present who were not members seriously to consider the advantages—numbers would add strength to the Society, he concluded. After Mr. Hartley's remarks, Mr. Levy then opened the meeting for discussion.

DISCUSSION

The first questions asked were: Whether a curing oven was really necessary; when applying the sealer to the plaster, could this be thinned and used as a swill; where could cork be bought, and what were the comparative costs relating to (1) solid-cast, and (2) laminated patterns. Replying to the first part of the question, Mr. King said the oven was not an essential part of the equipment. After gelation, however, the plastic was brittle and oven-curing overnight was a worthwhile precaution against breakage. Another member interjected to ask about plaster drying in an oven—wasn't this dangerous? The lecturer said that 160 to 180 deg. F. was the absolute maximum for plaster drying temperature and then there was little or no risk. Some plasters could be used "green," but subsequent stripping-off of the plaster from the pattern was not so easy. Referring back to the first speaker, Mr. King said that when making intricate-shaped patterns, the sealant could be thinned down and the excess swabbed or poured off. Three coats were needed. Mr. Levy interjected to say that ordinary shellac (button polish) could be used for this purpose. Mr. King next gave the name and address of a firm who could supply cork, and answering the last part of the first question, said that the cost of making patterns in plastic cost about 30 per cent. more than those made in wood, from existing masters. Another member said that with more-complicated patterns, nearer parity in cost was secured, and in his experience, even a saving was possible as compared with new wood patterns. The next question was whether it was necessary to face up and fix a backing plate for floor moulding, to which Mr. King replied that without backing the patterns wouldn't stand rapping, and really needed strut inserts as the plastic was not strong enough alone. In reply to a question as to what type of silicone release-agent was recommended, the lecturer gave a proprietary brand, but also said that almost any household silicone-wax polish could be used. As
an alternative to a split-washer roller for in
nating the fibreglass, an ordinary door-spring
be used, one speaker commented. A ques
asked what was the final thickness built up
using reinforcement of 0.010 in. fibreglass, foll
investment of the mould contour with paste
Mr. King answered that the fibreglass was emb
in the existing paste, but that for greater st
in a shell pattern, mechanically bound n
reinforcement was a necessary addition.

Plated Patterns

In reply to a query as to whether, with
patterns, the plastic could be poured through
in what was in effect a patternplate, Mr. Kir
he could see no objection to this procedure
Levy added that in such a case, added mech
keying or anchorage would be necessary
naturally, the pattern would be undetachabl
the plate. Here, a further speaker interject
information that he had on occasion us
aluminium frame and produced single-sided p
plates (or even double-sided matchplate pa
and these were then ready for immediate us
moulding machine. Another member c
audience asked, of the examples on view, w
the colour was integral or were the samples p
to which Mr. King answered that in some the
was integral and others had been varnished
best were now unpainted (with pigment
resin), but in every case the standard of
depended on the fineness of the plaster su
The next question asked was what type of me
cal mixer was best, say for 10-lb. lots or mo
minimum air entrapment. To this, Mr.
replied that he thought hand mixing by the s
was good enough. If a mechanical mixer wa
this had to be thoroughly cleaned each tin
awkward operation because of the risk o
trouble amongst personnel. He next recomn
one or two proprietary brands of barrier
which had been developed for protection an
removal from operators' hands, etc. In repl
question as to whether plastic patterns co
altered, Mr. King said this was a relativel
matter. Pattern parts could be cut off by ba
for example, and replaced in a new positio
the spaces built up and filed off. The fin
cussion concerned the use of " positive " moc
producing negative plastic patterns or cor
direct and the various merits of plaster and
when stripping from the plastic. Here, Mr
said that wood patterns often tended to stick
resin, plaster being very much easier to par
plastics. Wood patterns needed very careful
however, positive models could on occasion
for negative patterns or coreboxes.

Mr. E. C. Rowen, vice-president of the S
in proposing a vote of thanks to Mr. Kin
how much he had enjoyed his lecture, an
gratulated him also on the able way he cop
members' questions. Mr. Levy seconde
adding also his congratulations to Mr. King
most interesting contribution. (Mr. Kin
awarded the NSMP Levy Silver Medal for hi
in connection with the making of plastic pa

Correspondence

IRONFOUNDING INDUSTRY IN 1957

the Editor of the FOUNDRY TRADE JOURNAL

—I was most interested to read your summary ironfounding table in the census of production 55, 1956 and 1957 which appeared on page 137 September 10 issue of the FOUNDRY TRADE ıL.

aps more stress might have been laid upon ıited coverage of the census reports. For example ısus relates to foundries which in 1957 employed gregate number of 105,453 employees. In that he average employment for the whole ironng industry, as defined by the Iron and Steel was in fact 138,100. The main reason for this nce is that the census defines the industry in ι way as to exclude a large proportion of the ' foundries.

eneral, data drawn from the census, though not g to the whole industry in the sense that it is l by the Iron and Steel Board, can be used, as ave so well used it in your summary, to indicate ture of change in the industry as a whole.

, however, is not always so and on this occasion ears that the census gives a different and lower ion of capital investment by the industry. Table I shows estimates of capital expenditure by the industry which are derived from a survey made by the Iron and Steel Board, while showing the parallel census statistics* in an adjacent column.

The Iron and Steel Board statistics below relate only to firms producing approximately 70 per cent. of the country's iron castings and thus are themselves low, yet the census statistics are noticeably lower. The census then, as far as investment statistics are concerned, would not appear to be catching in its net a true sample of the foundries covered by the Iron and Steel Board.

One other point occurs to me to require some qualification. While it is true that the census indicates a rise in the net output per person employed from £669 in 1951 to £894 in 1957, this rise is partly the result of the steep general rise in prices and wages over the period, though of course increasing productivity has played a part.—Yours, etc.,

PHILIP MOORE,
Economics and Statistics Officer.

Council of Ironfoundry Associations,
14, Pall Mall,
London, S.W.1.

TABLE 1.—*Capital Expenditure at Ironfoundries* (× £1,000).

	Census statistics.				Iron and Steel Board survey statistics.		
	New building work.	Plant and machinery.	Vehicles.	Total.	On productive capacity.	On welfare.	Total.
..	1,572	3,723	662	5,957	6,250	750	7,000
..	2,449	5,819	658	8,926	9,500	1,500	11,000
..	2,374	6,270	618	9,262	14,000 (est.)	2,250 (est.)	16,250 (est.)

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* See page 76, " Development in the Iron and Steel Industry," Iron and Steel Board Special Report, 1957. H.M.S.O., price 4s. 6d.

ıirbairn Lawson Combe Barbour Report

.re issue " of the figures without a detailed ation could result in a false market in the comshares, state the directors of Fairbairn Lawson : Barbour, Limited, Leeds textile machinery acturers. In order as far as possible to avoid .e issue of the accounts and report for the year .rch 31, 1959, has been expedited.

closing of the works of the Dundee subsidiary the year, transfer of plant, machinery, stock, n-progress, etc., to Leeds, sales of some of the ary's properties and plant, and considerable aims formulated, coupled with a change in iation following revaluation of fixed assets at ɔse of the preceding year, make the accounts hat complicated and not easy to compare with evious year, except from the full accounts.

'ar as can be compared, trading loss appears to increased to £247,290 (£215,742), but the net s less than half at £63,534 (£156,039).

he circumstances, it is stated, the directors cancommend any dividends.

ırder to expand the business and to bring into mpany's works new forms of products divorced .ts traditional sales, Mr. W. Walker, the chairıas been in discussion for some time with ind parties, and he hopes to make some announceregarding progress by the time of the meeting, is to be held at Leeds on October 22. The ıan says there is no major problem other than ɔf expanding and improving the order-book n.

Mechanical Handling Federation

Meetings of Section II (continuous conveying equipment) of the Fédération Européenne de la Manutention (European Mechanical Handling Federation) were held in Lucerne at the end of last month, on the occasion of the European Congress. Mr. F. S. Stent, of Great Britain, was in the chair.

The Section reported that work was now completed on the first edition of the " International Terminology " and that considerable headway had been made on the second edition of the dictionary. Work was also being done on the production of a European classification and symbolization of materials to be conveyed, and in addition the Section had been studying the possibility of seeking a modification of the universal decimal classification. In connection with the latter, it had been decided to ask the FEM as a body to create liaison with the Fédération Internationale de Documentation, at The Hague, as the subject was one likely to affect all Sections.

It was also stated that common ground had been established between the FEM and the International Standards Organization on the standardization of certain aspects of troughed-belt conveyors, and a formula for the standardization of certain components of gravity-roller conveyors was now being dealt with. Examination of safety regulations operated in various countries would be continued.

The next meetings of the Section will be held in Stockholm at the end of June, 1960.

Equipment and Supplies

Continuous-immersion Pyrometer Tube

The difficulties with pyrometer tubes for continuous immersion in molten metal are well known, and have often resulted in such pyrometry being abandoned in spite of its technical advantages. Morgan Crucible Company, Limited, Point Pleasant, London, S.W.18, have developed a plumbago tube (Salamander) which is intended to overcome these difficulties. In tests so far it has given very promising results in aluminium alloys, copper alloys and cast-iron (see Fig. 1). The new tube is claimed to have excellent resistance to thermal shock, good thermal conductivity, good resistance to slags and reasonable strength. It is supplied ready glazed to resist oxidation. It has been deliberately made short and stubby, to give good mechanical strength. The thick wall at slag level ensures long life, whilst the thin reduced end surrounding the actual thermocouple junction gives rapid response to temperature changes.

Thermocouple Protection

The use of a loose impervious inner-tube is essential when platinum thermocouples are used, and such an inner tube is also generally recommended when base-metal couples are employed. In the latter case, 14 or 16 s.w.g. nickel-base couples are recommended. If base-metal thermocouples are used without an inner tube, the thickest possible wire should be chosen, consistent with the ½-in. bore of the Salamander tube. The standard Morgan Crucible inner-tube is a Triangle Impervious aluminous-porcelain tube, 355 mm. long, 8 mm. outside dia. and 5 mm. bore. For temperatures above 1,350 deg. C., a similar Triangle Impervious Mullite tube is recommended. The tubes are very resistant to thermal shock, and can be plunged into molten metal without elaborate pre-heating, although it is wise to make sure that the tubes are thoroughly dry and a least "hand warm." The response time when a cold tube (with inner-tube and platinum couple) is plunged into molten metal is approximately 2 min. to reach a true reading of 1,250 deg. C.

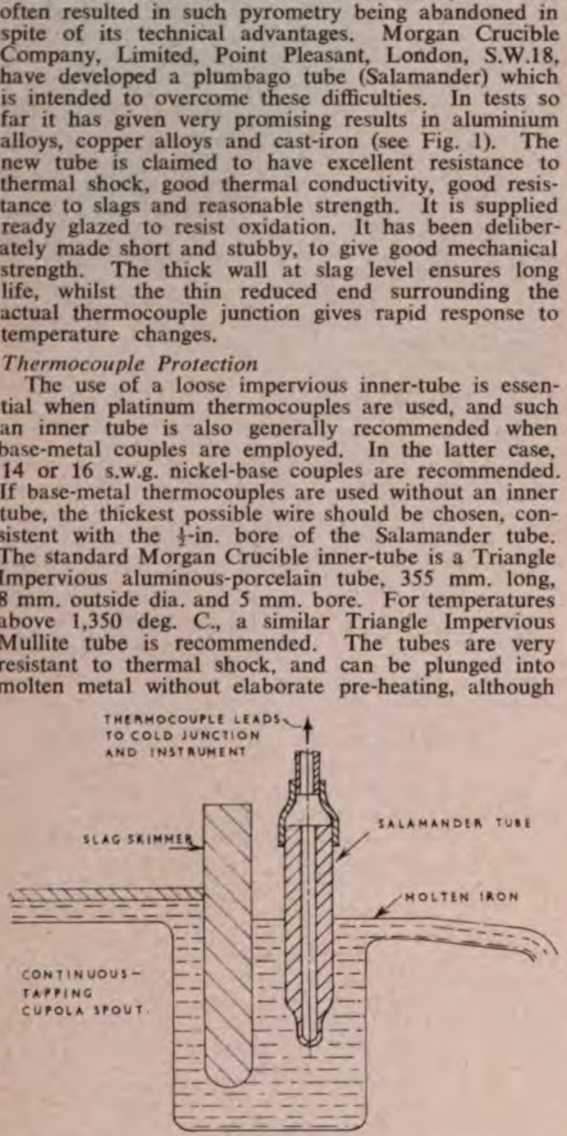

THERMOCOUPLE LEADS TO COLD JUNCTION AND INSTRUMENT
SALAMANDER TUBE
SLAG SKIMMER
MOLTEN IRON
CONTINUOUS-TAPPING CUPOLA SPOUT

FIG. 1.—*Section drawing showing temperature control of a continuous-tapping cupola, using a Salamander tube developed by Morgan Crucible Company, Limited, of London.*

Extension

As indicated above, the tube is deliberately kept short to provide strength, and long tubes are not recommended. The minimum immersion depth is 4 in., the maximum 8 in. Above the melt surface a metal extension should be used, and the diameter of the Salamander tube has been chosen so as to cement directly into a 2-in. B.S.P. socket, using Battersea Cement No. 38. Normal practice is to use a 2 in./¾ in. or 2 in./½ in. B.S.P. reducing socket, and an extension of ordinary steel pipe having the thermocouple junction box at the cold end (see Fig. 2). This extension tube should preferably be straight, but can have a bend in it providing the radius is not very small. In applications where the metal extension tube reaches red heat for long periods, it must either be protected by external refractory sleeving or must be made of heat-resistant alloy. If external protection is necessary, the thermocouple will need a mechanical handling device.

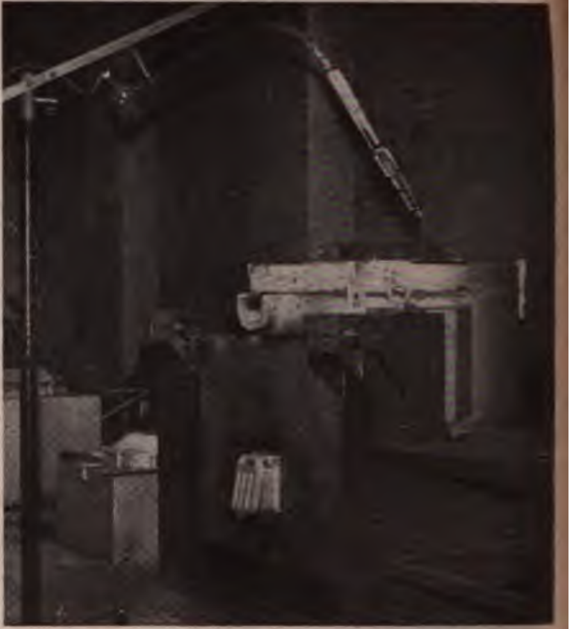


FIG. 2.—*Arrangement for intermittent temperature measurement in a crucible furnace, with (left) the pivot for the extension piece. The pivot stand may also be used to support degassing equipment.*

Applications

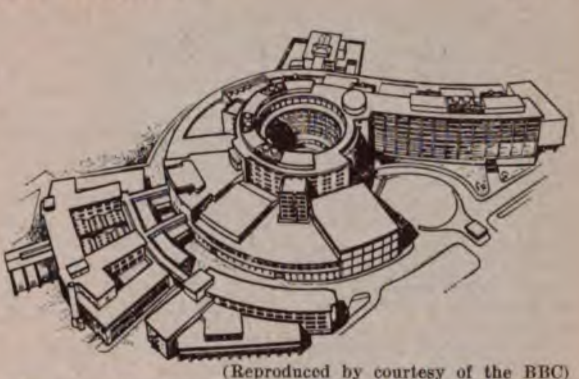
Morgan Crucible have prepared working data for the application of the new tubes to: crucible furnaces; reverberatory furnaces and cupola forehearths; cupola launders, and electric furnaces.

Dust-collector Servicing Scheme: Following a policy of after-sales service, Dallow Lambert & Company, Limited, of Thurmaston, Leicester, announce the introduction of a unit dust-collector servicing scheme, believed to be unique for this type of product. The scheme has been introduced to keep Dallow Lambert dust collectors in good condition and functioning efficiently. A fully-trained service engineer makes regular visits at six-monthly intervals, or at other dates mutually agreed.

the Television Centre needs Castings !

phant standing on one Leg s a Strength Criterion

3,000 iron castings, making a total weight ing 100 tons, will be embodied in the new levision Centre (see sketch, Fig. 1) now completion at White City, London. The ority of these will be frames and covers for the hundreds of yards of ducts, carrying iput and output cables. At one location ver 2,600 frames and covers (made by Engineering Works, Limited) have been needed for twin ducts 3-ft. deep, running around the whole basement perimeter (Fig. 2).



(Reproduced by courtesy of the BBC)

FIG. 1.—*Artist's 3-D impression of the new Television Centre being erected at White City for the British Broadcasting Corporation.*

The Centre includes the provision of no fewer than five studios radiating from a central multistoried block. The largest of these is 108 by 100 ft. by 54-ft. high, and one of them even accommodates a sizeable swimming pool, for aquatic displays. In these areas, some of the manhole covers and frames have been supplied by Broads Manufacturing Company, Limited. Asked how strong covers needed to be for this sort of duty, the guide who conducted the writer* on a tour of the building explained that in a TV studio it must be envisaged that a performing elephant might be required to stand on one leg; then, by chance, his foot might be placed squarely in the middle of a manhole cover. Thus, its weight was taken as a maximum load when designing covers to provide adequate strength.

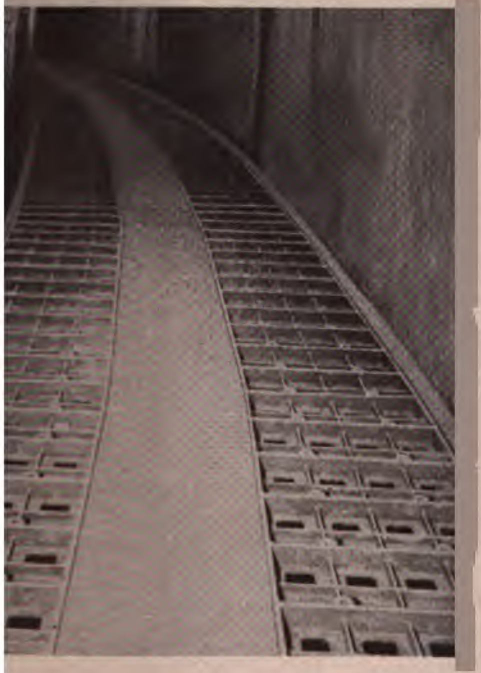


FIG. 2.—*Part of the twin installation of 2,600 duct frames and covers in a circular basement corridor of the new BBC Television Centre. For this particular installation, the supply and installation contractor was Dover Engineering Works, Limited. All the covers and frames had to be tailor-made at the works to permit assembly on the site, with the use of a bare minimum of " specials."*

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* The writer's thanks are recorded to the representative of Higgs & Hill, Limited, building contractors engaged on the BBC Centre, for conducting his tour. Permission from various authorities to publish these comments and illustrations is also acknowledged.

Polytechnic Courses

ospectus of part-time courses at the Borough ic, Borough Road, London, S.E.1, for the session is now available. It details over es covering a particularly wide range of ical subjects. Amongst these enter foundry technology. For the former subject a four- -time day course is provided, covering the nts of City and Guilds examinations. This well supported by a limited number of the district foundries, but it merits the backing more, as the boys receive a sound training in ces underlying their craft.

Sandvik expands Research Facilities

Sandvik Steel Works Company, Limited, Sweden, have decided to expand their existing laboratory facilities by the construction, at an estimated cost of £265,000, of a new five-storey building which will adjoin the company's main steel laboratory. The new building, which is scheduled for completion in 1961, will increase the existing main laboratory floor space from about 32,000 sq. ft. to approximately 70,000 sq. ft. and will contain the most modern equipment available. At present some 250 scientists and technicians are engaged on research and development work at the main steel laboratory.

Company News

A sharp rise in group net income for the six months to June 30, 1959, compared with the corresponding period of 1958, is reported by Imperial Chemical Industries, Limited. This year's figure is £20,227,000 (£13,591,000). The full year's net profit for 1958 was £23,855,000. The interim dividend is increased to 9d. (6.4d.) per £1 unit, the 1958 total being 1s. 7.2d. per unit. The half-year's sales advanced by £18,000,000 to £250,000,000, reflecting the net effect of an appreciable increase in volume and a reduction in selling prices.

The increase in volume of group sales is due mainly to the higher level of industrial activity in the UK, compared with 1958 and to a substantial increase in exports. Higher profits are attributable to lower unit costs of production arising from fuller utilization of manufacturing capacity and continuing improvements in technical efficiency. Sales volume and net profits for the first half of the year are more satisfactory, in relation to capital invested, than the disappointing results for 1958.

Josiah Parkes & Sons, Limited, hardware manufacturers and non-ferrous founders, etc., of Willenhall (Staffs)—The interim dividend is increased from 5 to 6 per cent.

Pollard Ball & Roller Bearing Company, Limited—The whole of the £75,000 5 per cent. "B" debenture stock, 1957-60, is to be redeemed at par on December 31, 1959.

Modern Engineering Machine Tools, Limited—The chairman, Mr. P. R. V. Wheeler, says that, provided current turnover and profit trends persist, he can predict with some confidence even better results in the current year.

Wickman, Limited, machine-tool and small tool specialists, of Coventry—The South African subsidiary has acquired more than 90 per cent. of the ordinary shares of D. Drury & Company, engineering suppliers, of Johannesburg.

Power-Gas Corporation, Limited—The interim dividend for the year ending September 30 is 7½ per cent., payable October 27. Last year's interim of 5 per cent. was followed by a 10 per cent. final and a special interim of 5 per cent. in respect of the current year.

George Wilson Gas Meters, Limited—Replying to a question by a shareholder, the chairman, Mr. W. D. Wilson, said that the rate of loss for the second half of the year under review was substantially reduced by the company's policy of diversification and the introduction of new products. He viewed the company's future with optimism.

Le Grand, Sutcliff & Gell, Limited, manufacturers of oilfield equipment, etc., of London, S.W.1—The offer by Stone-Platt Industries, Limited, to acquire all the company's preference shares for cash at 20s. per share has been accepted by holders of 95,570 shares, equivalent to 95.57 per cent. of the total, and has therefore become unconditional.

Crossley Bros., Limited, makers of diesel locomotives, marine and gas engines, of Manchester—Group trading profit for the year to April 30 contracted to £344,306 (£445,217) and the net profit to £94,613 (£107,764). Adjustments to allow for over- and under-provision of tax show a drop in the balance of only £6,186. The dividend is maintained at 12 per cent. *with an unchanged final of* 9 per cent.

William Doxford & Sons, Limited, shipbuilders, engineers, etc., of Sunderland—Group profits rose from £1,154,808 to £1,217,005 in the year ended June 30, 1959, and "in view of the high level of group profit," the directors recommend an increase of 5 per cent. in the final dividend to 25 per cent., making 30 (25) per cent. The directors, however, consider it unlikely that the level of profits will be maintained.

South Durham Steel & Iron Company, Limited—The directors announce that the Finance Corporation for Industry, pursuant to its agreement with the company, has elected to exercise its option to convert £2,000,000 nominal amount of its outstanding loan to the company into ordinary shares at par. The company accordingly issued 2,000,000 ordinary £1 shares on October 1. No Stock Exchange quotation is being sought at present for the new shares.

Ransomes, Sims & Jefferies, Limited, manufacturers of agricultural machinery, etc., of Ipswich—The rights offer of 500,000 ordinary shares of £1 each at 20s. per share has met with acceptances as to nearly 98 per cent. Applications were also received for approximately 382,000 excess shares and allotments in respect of these have been made on the basis that applications for up to eight shares have been allotted in full, and all other applications have been allotted eight shares.

Webley & Scott, Limited, engineers and machinists, of Birmingham—Arusha Industries, Limited, announced last week that it had received over 80 per cent. acceptances and the offer for the company's ordinary shares would close on Tuesday, October 6. On behalf of the shareholders it is representing, Franco-British & General Trust has written to the board of Webley & Scott asking for answers to a number of questions arising mainly from the 1959 Webley & Scott accounts which were not available at the time of its previous letter.

M.L. Holdings, Limited, grey-iron founders and general engineers, of Slough (Bucks)—Sir Noel Mobbs, chairman, says that present indications are that results for the current year will be no less satisfactory than those for the successful year to March 31, 1959. Orders for the group's specialized products remain at a high level, and, at the same time, the scope of the activities is widening, particularly in respect of general engineering work. Group net profit for 1958-59 rose to £97,589 (£76,653) and the total dividend of 25 per cent. is 5 per cent. more than the forecast given when the company was made public last November.

New Marketing Organization

Formation of a marketing organization between Stone-Platt Industries, Limited, which has more than 60 member companies, and the Carrier Corporation, Syracuse, New York, was announced in London on September 30. The new organization will be known as Carlyle Air Conditioning & Refrigeration, Limited, and it was stated that the operation of the organization would mean increased exports and more employment in Lancashire, Clydeside, and south-east London.

The organization, with offices in London, will market equipment manufactured by certain companies in the Stone-Platt group, under licence from Carrier International, a subsidiary of the Carrier Corporation.

A statement issued jointly by the Carrier Corporation and the Stone-Platt group said that the Corporation has a controlling interest in the new concern. The equipment marketed by Carlyle Air Conditioning & Refrigeration will be identical in basic design and performance to the corporation's equivalent products in the US, but detailed variation will be made.

Votes from the Branches

London

first meeting of the 1959/60 session of the on branch of the Institute of British Foundrymen eld on Wednesday, September 23, at the Constitu- Club, Northumberland Avenue, London, W.C.2, about 100 members and visitors were present.). E. B. Barnard (the outgoing president) intro- Mr. J. Bain, the new president for the coming n, saying that Mr. Bain had many foundry asso- ns and was very well qualified to occupy the and that he took much pleasure in investing him he badge of office. Mr. Bain acknowledged these remarks and said how much he was looking rd to his year of office as president, and asked larnard to remain in the chair for the evening.

his presidential talk, Mr. Bain described his trip to the Argentine and Brazil, when he covered 16,000 miles, including about 4,000 miles of inside South America. He described the foundry, rial and economic set-up in the countries visited, ompared these with conditions in this country. lain's address was given in a most informal way is audience were most enthusiastic about the way ich it had been given and also its interest. Before oceedings continued, Mr. F. A. Wilson interjected ank you" to Mr. Bain.

Automatic Moulding

.t, Mr. Barnard introduced the lecturers for the ıg and said how pleased he was to welcome Mr. ear and Mr. R. D. Mills (of Rubery, Owen & any, Limited) who had come along to talk about "Development of an Automatic Moulding n."* Mr. Spear (director of research) described velopment of the system for making small cast- rom its first conception by an individual inventor ng in a small way, its growth with a small rship, the taking over by an industrial concern, ne further research and development carried out. Mills (manager, foundry-equipment department) ollowed with a description of the plant as it stood and enumerated the sort of applications for it was being used. The plant was illustrated by a short film, and a display of components.

liscussion, a member asked how the temperature sand was kept down. To this, Mr. Mills replied ne amount of sand stored in the system described bout three tons and it was turned over once per So far, they had been making lighter types of gs, up to about 6 lb. in weight, and the sand did et hot. The system, however, was quite flexible, the sand-storage capacity might have to be sed. Mr. Spear also added that the moisture nt of the sand was kept under observation. Auto- moisture content and sand temperature control een considered, but were not thought worthwhile. ther questioner asked if the operation of the allowed sufficient freeze time for non-ferrous gs, to which Mr. Mills replied that non-ferrous gs had not been produced on the unit so far. was a maximum period of five minutes allowed oling before the knock-out; if the castings to be ced would freeze in that time, they could be produced on the unit. Only a few trials had as een made with non-ferrous castings, Mr. Spear . Another member wanted to know what air ure was required to operate the main squeeze, what was the volume of free air required by the plant and what was the mould hardness. Mr. Spear said free air at 80 cub. ft. per min. at 100 lb. per sq. in. was needed. Mould harness could be varied by the use of the static strickle bar. A further questioner wanted to know where the sand additions were made, to which Mr. Mills replied that these could be carried out conveniently at the knock-out, the additions were made manually and the mill was manually controlled. Questioned as to the reason for adopting malleable-iron moulding boxes, Mr. Mills said it was not possible to get a suitable steel box at a reasonable cost. Grey-iron had been tried but this material easily broke and they had found that a malleable cast-iron box stood up well to the conditions required.

Asked how molten metal supplies varying in amount were arranged, Mr. Mills explained that it was obviously necessary to have a continuous and flexible supply of metal; for this a cupolette could be used in conjunction with ordinary cupolas. Mr. Spear said that the metal demand might vary around 4 tons per hour (plus or minus 2 tons per hour) and the precautions taken to balance metal production were those which were normal in foundries. Another speaker pointed to the value of the syphon-brick tapping arrangement for the cupola, making it possible to melt anything from 1 to 5 tons per hour. A further member pointed out that if there were two patterns on the machine, presumably four different volumes of sand would be required. Mr. Spear answered that this was a valid criticism of the machine, but broadly speaking, patterns were selected which paired up fairly well. Another member wanted to know why the knock-out operation was not made automatic. Mr. Spear explained that an automatic device was being developed and a design was already partly completed. The speaker stressed that he meant "fully automatic," to which Mr. Spear replied that he did not think this would be a really economic proposition, for there had to be a man at the knock-out in any event.

This concluded the discussion and Mr. D. A. C. Hutchison proposed a vote of thanks on behalf of the branch to the president for his address and to the lecturers. He said how much he admired the way Mr. Spear and Mr. Mills had answered the questions and for the able way they had put across their lecture—it was done with professional brilliance. Mr. J. P. P. Jones seconded and added that hitherto this country had been backward in developing new devices for the foundry industry.

South Africa

A very interesting programme of events is listed in the July to December syllabus published by the South African branch. In addition to the monthly meetings, there was a works visit in August to the National Motor Assemblies (Pty.), Limited, last month the branch held a social evening and a problems evening, there is to be another works visit this month and the branch dance will be held in December. Of the papers, two—"Pyrometry, the Science of High-temperature Measurement" by Mr. F. P. A. Robinson, and "Foundry Sand-testing and Casting Defects" by Dr. P. H. Riley—have already been reported in the JOURNAL. This month the lecturer will be Mr. A. Cluett on "Malleable Cast Iron" and the November lecture will be by Mr. J. H. Martin on "Electric-arc Melting Practice."

The bi-monthly programme of the newly-formed Natal section includes a social evening, a lecture on "Moulding a Massive Monument" by J. Steele, and the first annual dinner of the section in November.

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account of this system was published in this JOURNAL, August 5.

News in Brief

THE DERBY BRANCH OFFICE of United Dominions Trust, Limited, is being moved to new premises, and as from October 12 the address will be Martin's Bank Chambers, Market Place, Derby.

ABOUT 80 WORKERS in the Birmid group of companies were last weekend presented with long-service awards at the works of the Birmingham Aluminium Casting (1903) Company, Limited, at Smethwick. There are now 1,370 employees in the group with 25 or more years' service.

THE SIXTH REGIONAL OFFICE of the British Institute of Management which has been opened in Bristol at St. Giles House, Quay Street, is to be the headquarters of the South Wales and West of England Regional Council of BIM. The new regional manager is Mr. I. D. Cunningham.

MILLSPAUGH, LIMITED, the Sheffield pulp- and paper-machinery builders, have agreed a contract with Poland worth hundreds of thousands of pounds for the manufacture of cellulose wadding. A subsidiary of Hadfields, Limited, steel makers, Millspaugh, are negotiating further important contracts with Poland.

LORD RIVERDALE opened, on October 1, a careers exhibition organized by the Sheffield Junior Chamber of Commerce and the Sheffield Youth Employment Bureau, and held at the Edmund Road Drill Hall, Sheffield. It was attended by 1,200 pupils and exhibits included models of machinery and examples of work of different industries.

A STUDY CONFERENCE of foundry technician training is being held under the auspices of the Council of Ironfoundry Associations at the Worcestershire Brine Baths Hotel, Droitwich, on November 11 and 12. Executives interested in this subject and who would like to attend the conference should write to Mr. F. C. Hayes, the training officer at 14, Pall Mall, London. S.W.1.

THE WEST RIDING and North Derbyshire area training committee of the British Iron and Steel Federation are to make an analysis of the jobs done by foremen. The committee's report states, "It is hoped that this initial work on analysis of foremen's jobs will produce a useful lead in establishing a more satisfactory basis for selection and training of foremen than can be achieved at present."

MR. DAVID EDWARD ALLEN, who is now on the staff of the Brown-Firth Research Laboratories, is the first student of the Sheffield College of Technology to win a technical State scholarship. Aged 22, Mr. Allen has been a student in the science department since September, 1953. Last year he was awarded the ordinary national certificate in metallurgy, with distinctions in chemistry and physics.

THE WOLVERHAMPTON BRANCH of the Amalgamated Union of Foundry Workers held a dinner on September 26 to mark the 150th anniversary of the foundation of the Union. Among the guests were the Mayor of Wolverhampton, Alderman Norman Bagley, members of Wolverhampton Town Council and the district secretary and organizer of the Union of Foundry Workers, Mr. G. Greenhouse.

THE 50 MEMBERS of the Swedish Excavator Owners' Association who visited Newton Chambers & Company, Limited, Chapeltown, on September 29, were told by Mr. S. L. Waide, executive director of the chemical division of the firm, that the new "Outer-*Seven" agreement meant* that Britain and Sweden *were "standing on the brink* of new and exciting possibilities," and that the "new agreement may be the forerunner of free trade."

AN EXTENSION to the factory of Electropol Processing, Limited (commercial electropolishers of stainless and other metals) at the Farnham Trading Estate, Surrey, will treble its present capacity. This is the fourth extension since 1952 when the firm moved from a Nissen hut opposite Bourne Mill (of Domesday Book fame) at Farnham seven years ago. The new extension is of 13,000 sq. ft. area and was designed and constructed in pre-cast concrete by Hewitts of Cranleigh.

MR. W. J. MCBRIDE, a director of Edgar Allen & Company, Limited, and head of the engineering division, recently attended the official opening, by the Shah of Persia, of the Doroud cement plant ordered by the Seven-Year-Plan Organization of Iran. The plant will produce daily 600 tons of portland cement. Equipment supplied by Edgar Allen includes 2 rotary kilns, a primary crusher, wash mills, and tube mills for raw and finished materials, together with all ancillary equipment.

A CONSIDERABLE DECREASE in unemployment in Sheffield is shown in a recent report. A total of 2,900 people—2,262 men and 638 women—were unemployed on September 14, and 255 were working short-time. The total in these two categories, 3,155, represents 1.15 per cent. of the city's insured population. This compares with the previous month's percentage of 1.24 and is half of the September, 1958 percentage of 2.3. A year ago there were about 6,000 workers on short-time, and these now number less than 700.

FOLLOWING THE SUCCESS of last year's Rayburn Window Display Competition, Allied Ironfounders, Limited, have again organized a similar contest, and this year (entries had to be received before October 5) there was a choice of three themes for the displays. The winner of the first prize will have the choice of either a Golden Shark 16½-ft. cabin cruiser, or £500, or the professional services of a window-display consultant for a period of six months. A second prize of £200, a third of £100, and 20 prizes of £10 each will be awarded to the runners-up.

HEAD WRIGHTSON IRON AND STEELWORKS ENGINEERING, LIMITED, a subsidiary of Head Wrightson & Company, Limited, are to supply an additional sintering plant to the Aviles Works of Empresa Nacional Siderurgica SA, the Spanish national steel company. The new plant will form an extension to the existing sinter plant and is designed to produce an additional 10,000 tons of blast-furnace sinter a week. Total value of the equipment to be supplied is approx. £500,000. Manufacture is well in hand and delivery is expected to be complete by January, 1960.

ONE OF THE LARGEST electric heat-treatment furnaces in this country is to be built by Birlec, Limited, for the English Steel Company Limited, Sheffield, at a cost exceeding £65,000. The furnace is of the pit type with effective internal dimensions 35 ft. deep by 8 ft. dia., and a rating of 1,220 kw. It is to be used for the heat-treatment of alloy-steel forgings up to 100 tons in weight, and special features will include a control system to ensure very close temperature tolerances and provision for controlling the composition of the furnace atmosphere. This is the latest of several large Birlec furnaces used by this company for the treatment of heavy forgings, including one 60 ft. deep by 12 ft. dia.

THIRTY SENIOR EXECUTIVES from more than a dozen UK factories in the David Brown group of engineering companies took part in a management conference at the Old Swan Hotel, Harrogate, last weekend. The

:tive of the conference, a new venture by the d Brown organization, was to bring all general divisional managers together to discuss some of broader aspects of current and potential indus- problems. Subjects covered included "The Prob- facing Great Britain in her World Position"; :nds in the Trade Union Movement"; "Manage- : and Labour Relations"; and "Problems and pects of British Export Trade." The conference n on Friday evening and ended on Sunday after- l.

IE INAUGURATION of the newly-formed Heavy .nic Chemicals Group of the Society of Chemical stry will take place at a meeting of the Society e held at 14, Belgrave Square, London, S.W.1, on ember 12. The chairman of the new group is R. Holroyd; Dr. M. A. Matthews is deputy chair- and the hon. secretary is Mr. H. P. Hodge. The gural lecture entitled "Production of Bulk Organic nicals" will be given by Mr. D. G. Smith at m. The Society also announces that Dr. W. M. ıpton, O.B.E., will deliver the fifth Chance ıorial Lecture under the title "Development of ıaces for Glass Melting" on Tuesday, Febru- 9, 1960, in Birmingham. Non-members will be ome at both meetings.

NDON'S STREETS are to be cleared of 24,000 poles carry the overhead tracks of London Transport utive's trolley-buses. The contract for their re- ıl has been awarded to George Cohen Sons & pany, Limited, the company that is already ged on scrapping 1,400 of the Executive's trolley- s. Residents along the routes need not fear noise :anes remove the poles from the six feet of con- in which each is anchored. The firm's dis- :ling department have developed a system for g much of the job in silence. First, the poles be cut through just above ground level. Next, aulic pressure will be used to distort the base of ›ole below ground and, by so doing, to crack the rete surrounding it. Thus freed, the stumps can 'ithdrawn smoothly, without digging, without noise above all, without risk of damage to nearby hone cables and other services.

Obituary

ıe death has occurred at the age of 57 of Mr. RGE WOOD, manager of the maintenance and ıine department of Clay Cross (Iron Foundries), ted. He had been with the company for 44 years.

r. WILLIAM HALL, former foundry manager at the :sfield works of the Brightside Foundry and neering Company, Limited, died in Sheffield on ber 1 at the age of 74. He served the company nore than 36 years, and retired six years ago.

ıe death occurred last month of Mr. JOHN JACKSON, s manager and a director of Matterson, Limited, ıine-tool and crane manufacturers, Shawclough, ıdale. Aged 47, Mr. Jackson joined the firm as .pprentice when he was 16 and was appointed s manager in his early twenties. He became a tor three years ago.

:. BASIL WILSON DONCASTER, chairman of Daniel :aster and Sons, Limited, Penistone Road, Sheffield, 1948 to 1955, died on September 29 at the age 4. He joined the firm, which was founded by great grandfather, in 1906, and was a director 1909 until his retirement in 1955. He was a man of the Cutlers' Company, and formerly sented the Crucible Steelmakers' Association on Council of *Sheffield Chamber of Commerce*.

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Hark! I hear the Foundry Foreman,
Bellow to the Foundry Storeman,
What have you inside that door man?
HOOKER'S goods I hope!

Why not take a look man,
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We have HOOKER'S goods galore man,
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While I'm in the Store.

Yes, we've all that matters,
Even foundry ratters,
If you've pestilential rats
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Personal

Retirement of Mr. F. Arnold Wilson

From to-day's date, the retirement is announced of Mr. F. Arnold Wilson, manager of the home pig-iron department of Wm. Jacks & Company, Limited, a great nephew of Dr. William Jacks, the founder of the firm, which he joined in 1919. Educated at Glasgow Academy, Sedburgh School and Christ's College, Cambridge, Mr. Wilson served in the 5th Battalion Cameronians during the 1914/18 war and was mentioned in despatches and awarded the Mons Star. After the war, he spent a short time with Pease and Partners and travelled widely on the Continent, USA and Canada, visiting foundries and steelworks before, in 1937, being promoted to his present position with William Jacks. Mr. Wilson has been a member of the Institute of British Foundrymen since 1936, and was honorary secretary of the London branch for many years, presiding over that branch in 1947/48; he has been a member of the IBF national Council and its finance committee for about 20 years. Mr. Wilson has been a Liveryman and Freeman of the Worshipful Company of Founders since 1948. He has also served on many other foundry industry committees, among them the Pig Iron Merchants Association, Foundry Coke Merchants Association, National Federation of Iron and Steel Merchants and is a member of the Iron & Steel Institute. After retirement, Mr. Wilson is to continue with William Jacks in a consultative capacity.

Mr. E. N. **Egan** has retired from the board of Folland Aircraft, Limited.

Mr. S. A. **Roberts** has been appointed managing director of B.S.A. Tools, Limited.

Mr. C. R. **Curtis** has resigned from the board of A.B.C. Coupler and Engineering Company, Limited.

Mr. G. R. **Giles** and Mr. H. S. **Hull** have been appointed directors of the British General Electric Company Pty., South Africa.

Mr. E. P. **Purcell** has been appointed to the board of George Cohen (Dublin), Limited, a member of the George Cohen 600 Group.

Dr. F. A. **Tatford**, director of contracts, U.K. Atomic Energy Authority, has been elected president of the Institute of Public Supplies Officers.

Mr. A. E. **Bell** has been appointed commercial manager of Distington Engineering Company, Limited, a branch of the United Steel Companies, Limited.

Mr. **George Heywood**, general manager of John Hall and Son (Oldham), Limited, ironfounders and engineers, has been appointed a director of the company.

Mr. A. **Moore** has been appointed area technical representative for Brayshaw Furnaces, Limited, Belle Vue Works, West Gorton, Manchester, for the North and East Midland areas.

To-day in the national Parliamentary elections, Sir **Frank Markham**, a director of Foundry Equipment, Limited, is defending his seat as M.P. for the North Buckinghamshire constituency.

Mr. **Malcolm J. Crawford**, managing director of the Wayne Tank and Pump Company, Limited, Bracknell, Berks, has been appointed chairman of the company in succession to the late Mr. **William H. Gibson**.

Mr. D. C. H. **McLean** has been appointed managing director of the Lamson Engineering Company, Limited. He succeeds Mr. R. L. **Herring**, who has resigned the managing directorship for reasons of health but retains his seat on the board.

Mr. F. V. **Thompson** has been appointed director of personnel of British Insulated Callender's Cables, Limited. He relinquishes the position of secretary and manager (personnel). Mr. J. P. **Hourston** has been appointed secretary, and is succeeded as assistant secretary by Mr. G. V. **Tew**.

Mr. **Douglas Sharp** and Mr. **Graham Donald** have retired from executive management of Scottish Machine Tool Corporation, Limited. Mr. Sharp, however, continues as chairman and Mr. Donald retains his seat on the board. Mr. A. **Bennie** has been appointed sales manager.

Mr. A. K. **McCosh** and Mr. H. C. **Waterston**, chairman and vice-chairman respectively, of William Baird & Company, Limited, and of Bairds & Scottish Steel, Limited, have relinquished their appointments for reasons of health. Mr. McCosh will, however, retain his seat on the board of William Baird & Company.

Mr. **Frank Leonard**, superintendent of the factory of Peglers, Limited, brassfounders, Doncaster, has left for South Africa to become works manager for Peglers in that country. Mr. Leonard who has been with the company since he left school in 1922, was presented with a gift from his colleagues before leaving for South Africa.

Mr. **Eric Joyce**, managing director of Oakes Turner and Company, Limited, gold and silver refiners and bullion dealers, 75, Eyre Street, Sheffield, has retired from that post, but remains a consulting director. A presentation was made to him on behalf of the employees by Mr. H. R. **Lovell**, who succeeds him as managing director.

Mr. **William Broadbent** retired last week as managing director of Robert Broadbent & Son, Limited, ironfounders and manufacturers of quarry machinery, etc., of Stalybridge (Ches), after 68 years with the company. Mr. M. H. **Applegate** has been appointed general manager and Mr. **Norman Broadbent** will continue to serve the company as technical director.

Mr. T. G. **Edmondson** has been selected as a technical officer of the Combustion Engineering Association in succession to Mr. **Andrew Laird** who has relinquished this post to take up another appointment. Mr. Edmondson was educated at Wellington College and N.W. Kent College of Technology. After a period of training with Humber, Limited, he served with J. & E. Hall, Limited, and later with Todd Oil Burners, Limited.

The retirement is announced of Mr. C. **Shaw** who, for 46 years, was manager of the traffic department of Edgar Allen & Company, Limited, Sheffield. After service in the first world war, he organized the company's traffic department, taking charge of the internal transport of the company in 1937. He served on the Sheffield Chamber of Commerce for approximately 35 years, and on the transport committee of the National Federation of Iron and Steel Manufacturers for nearly 30 years.

Recent Wills

Lewis, G. L., managing director of George Lewis & Son, Limited, agricultural engineers and merchants, of Kettering (Northants)	£39,134
Macharg, Sir Andrew Simpson, chairman of A. & J. Main & Company, Limited, and a director of the North British Locomotive Company, Limited, Bairds & Dalmellington, Limited, Gourock Ropework Company, Limited, and other companies ...	£167,380

Electrical Aids in Industry

Data Sheet **No. 7**

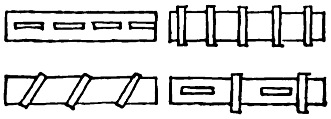
Lighting-2

The general principles of factory lighting have been dealt with in the previous data sheet (No. 6). This one considers briefly certain factors—not always fully appreciated — that influence the lighting for some particular factory applications. The next data sheet will carry the subject further.

Work benches

The most universal application of lighting is to bench work, for there is no branch of manufacturing that does not have its work benches which, of necessity, are used for a great variety of occupations. No single lighting method is suitable for all cases.

The introduction of fluorescent lighting has gone a long way to solving one of the main problems here; for while the high degree of brightness of filament lamps tends to preclude their use for individual lighting owing to the glare, the fluorescent tube with its greater expanse of light source has made localised lighting with a low mounting height more practicable. Moreover, the length of the fluorescent tube makes it possible to control shadows.



With narrow individual benches (not more than 4 ft. wide), there are four basic methods of localised lighting: longitudinal, transverse, diagonal or a combination of longitudinal and transverse. With wider benches it is not advisable to use fittings directly over benches, and fittings should be behind the workers at each edge of the bench. Where particularly high illumination is required, fluorescent fittings may be mounted as local lights — low enough for the skirt of the reflector to conceal the lamps from the eye of the operator.

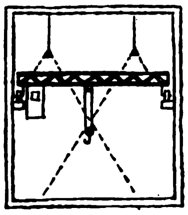
High-bay shops

Probably the most difficult of all factory lighting problems is that of high-bay lighting. In lofty, long and sometimes necessarily dirty shops such as those which house really large machine tools and overhead cranes, it requires great ingenuity, coupled frequently with high lamp wattage, to provide adequate illumination. From the planer operator to the slinger, the workman is dependent on good lighting if he is to avoid an over-cut or a serious crane mishap.

The major problems associated with the lighting of high and relatively narrow shops, such as heavy machine shops, are:

- (a) Poor light utilisation caused by excessive light absorption by the large and often dark wall area.
- (b) Preponderance of light flux downwards and poor cross lighting causing poor illumination on vertical surfaces, and heavy shadows.
- (c) Possibility of heavy light absorption in the atmosphere.
- (d) Difficulty of access to high fittings for maintenance.

In high-bay workshops there is a tendency to use concentrating fittings so that the maximum proportion of the light output reaches the working area without spread to the walls, but the saving in wall absorption is obtained only by accepting a depressing environment, poor cross lighting and heavy shadows.



In many cases it is good practice to accept the inevitable reduction in light utilisation by wall absorption and to reduce this by applying light colours to interior surfaces where possible throughout. This approach results in more cheerful conditions and provides equally good illumination values and better cross lighting. Even better is to add angled lighting from the sides below crane level.

In this type of shop, rapid deterioration in light source intensity due to dust must be expected. Facilities should always be provided for easy access to fittings for cleaning and maintenance.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on electricity and productivity (8/6 each, or 9/- post free) are available — "Lighting in Industry" is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity, including one on industrial lighting. Ask for a catalogue.

7931-4

Raw Material Markets

Iron and Steel

There is very little, if any, change in the pattern of business among the ironfoundries, and the production of castings follows closely on the lines which have ruled for some time. Fortunately for the makers of high-duty castings, demands have been maintained at appreciable levels for quite a long time, particularly from the motor vehicle trade, and the foundries catering for this trade have been able to obtain good outputs.

Many of the engineering and speciality foundries supplying high-duty castings to other users have been less fortunate; business has been on a fluctuating basis, particularly in the case of the machine-tool industry, heavy engineering, steelworks, collieries, and railways. The demand for castings from the machine-tool trade is now showing some improvement and the same is true of the call from the steelworks. From the collieries and railways, however, demands are still only moderate.

Many of the light-castings foundries continue to do better following a long period of slackness, but there is still room for improvement, plants generally working well below capacity levels. The jobbing foundries maintain a fair rate of employment, but could undertake more work, as could also the textile foundries. The demand from these foundries for high-phosphorus pig-iron shows little expansion. Orders placed are confined mainly to those tonnages required for current consumption and the maintenance of a small working stock.

The engineering and speciality foundries maintain a brisk demand for low-phosphorus iron; adequate supplies are available. There is also a fairly good call for hematite, but not sufficient to absorb current outputs and the fairly appreciable stocks held by the furnaces. Refined irons are plentiful.

The foundries are able to obtain without difficulty their scrap requirements, apart from the better qualities of cast-iron scrap such as cylinder blocks, although recently there has been some improvement in the quantities arising of this grade. Foundry coke deliveries are satisfactory. Ganister, limestone, and firebricks are available to requirements.

Business at the re-rollers is maintained and outputs of all their products are now on a much improved scale. Good demands continue for small bars and light sections, and the mills supplying reinforcing rods are very busy. Deliveries of steel semis from home steelworks are generally meeting requirements, but the demand is now much heavier, with the result that suppliers are fully committed for their outputs for some time ahead. There is also a brisk demand for suitable defectives and crops as they arise.

Non-ferrous Metals

A strike at the El Teniente mine in Chile and a US dock strike, which were only possibilities last Thursday, have become realities. Indeed, negotiations collapsed at Braden's El Teniente mine and the strike started on Friday, the same day the US dock strike became effective. The present position is clear, if depressing. Strikes in the US encompass the copper industry, the steel industry, and the ports on the east coast. In addition, there is the strike at El Teniente and a deal of unrest in the Belgian Congo which could conceivably tie up that country's copper production. The first organized strike in the country's history started at the beginning of this week. In these circumstances, the London quotation has surged ahead and looks like going higher. However, the net effect of all these strikes is difficult to analyse. Stocks of copper are obviously dwindling rapidly. But the steel strike is becoming so serious that demand is falling away. Moreover, the strike of the dockers in all Atlantic and Gulf ports virtually insulates the US from receiving supplies from the UK, which will prevent the London quotation from going ahead too fast.

The position and prospects for a settlement of the strikes is also difficult to assess. There is no sign as yet of the copper industry coming to terms, but hopes are high that the strike at the El Teniente mine will soon be resolved. All in all, these strikes have made about 1,000,000 US workers idle. The US quotations remain unchanged, with custom smelters (there is only one major smelter in operation) quoting 33 cents only for December/January copper and producers 31½ cents a pound.

In London the market is firm and the statement has been made that much of the Board of Trade stocks, which totalled 30,000 tons, have been sold. If so, London prices will be forced up faster than they otherwise would have been without this shock absorber in the background. Copper stocks in LME warehouses at the end of last week totalled 13,063 tons, a drop of 175 tons on the week.

Tin is firm again despite the fact that the Eastern quotation has not yet fully recovered its former buoyancy. Continental and US demand are satisfactory and, it is said that the buffer stock manager has been in the market again to keep prices from going too high. Nevertheless, the LME quotation [illegible] now at its highest since February, 1957, and [illegible] prospects of a settlement in the US steel industry [illegible] the consequent rise in demand for tinplate, which, [illegible] is believed, would result is keeping this market [illegible] firm. In the US the price is now above $1.03 a pound. Tin stocks in LME warehouses at the end of last week declined by 256 tons to 8,338 tons.

Lead still remains the weakest of all the non-ferrous metals but, even so, the London price has climbed above £70 a ton and there are many who believe the quotation will go higher in the weeks ahead. How high it will go is probably determined by the scrap market, which functions to its own advantage at around £75 a ton. In the US the market is lifeless and the price is 13 cents a pound.

Zinc is a good market and the price has more than recovered last week's losses. Demand is satisfactory, nearby metal is still hard to find, and hopes of the steel strike being settled makes for a very firm undertone. In the US the price is 12 cents a pound.

George Kent's Conference

A four-day technical and marketing conference was held by George Kent Limited, at Luton, in the week beginning September 28 under the chairmanship of Commander P. W. Kent, R.N. Discussions were preceded by a review of company policy; also dealt with were future plans in relation to the company's range of industrial instruments, meters and automatic controllers in home and export markets. Attending the Conference were members of the firm's world sales organizations in seventeen foreign countries in addition to UK area representatives, the board of directors of the parent company, and senior research, development, production, service and sales engineers.

Mr. J. I. YATES has left the board of Radiation, Limited.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

October 7, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 10-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 9d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 9d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy). —4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons. £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £233 15s. 0d. to £234 0s. 0d.; three months, £233 5s. 0d. to £233 10s. 0d.; settlement, £234 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3¼d. per lb.; rods, 250s. 6d. per cwt. basis; 20 s.w.g., 285s. 6d. per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £794 10s. 0d. to £795 0s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—First halt October, £70 0s. 0d. to £70 2s. 6d.; first half January, £71 2s. 6d. to £71 5s. 0d.

Zinc.—First half October, £87 0s. 0d. to £87 5s. 0d.; first half January, £85 5s. 0d. to £85 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 5s. 0d.; rolled zinc (boiler plates), all English destinations, £120 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £99 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10¾d. per lb.; sheets to 10 w.g., 202s. 9d. per cwt.; wire, 2s. 8½d.; rolled metal, 202s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £154; B6, £202.

Brass (High Tensile).—BS1400, HTB1, £187; HTB2, £203; HTB3, £217.

Gunmetal.—BS1400, LG2, £193; LG3, £203; G1, ½%, £253; G1, 1%, £242.

Phosphor Bronze.—BS1400, PB1 (AID released), £290; BS1400, 90/10/1, £268.

Leaded Phosphor Bronze.—BS1400, LPB1, £213.

Phosphor Bronze Strip, etc.—Strip, 290s. 3d. per cwt.; wire, 4s. 1d. per lb.; rods, 3s. 4¼d.; tubes, 3s. 4¼d.; chill cast bars: solids 3s. 4d.; cored 3s. 5d. (Charles Clifford, Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3¼d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £240; AB2, £250.

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* Average 68-70 per cent.

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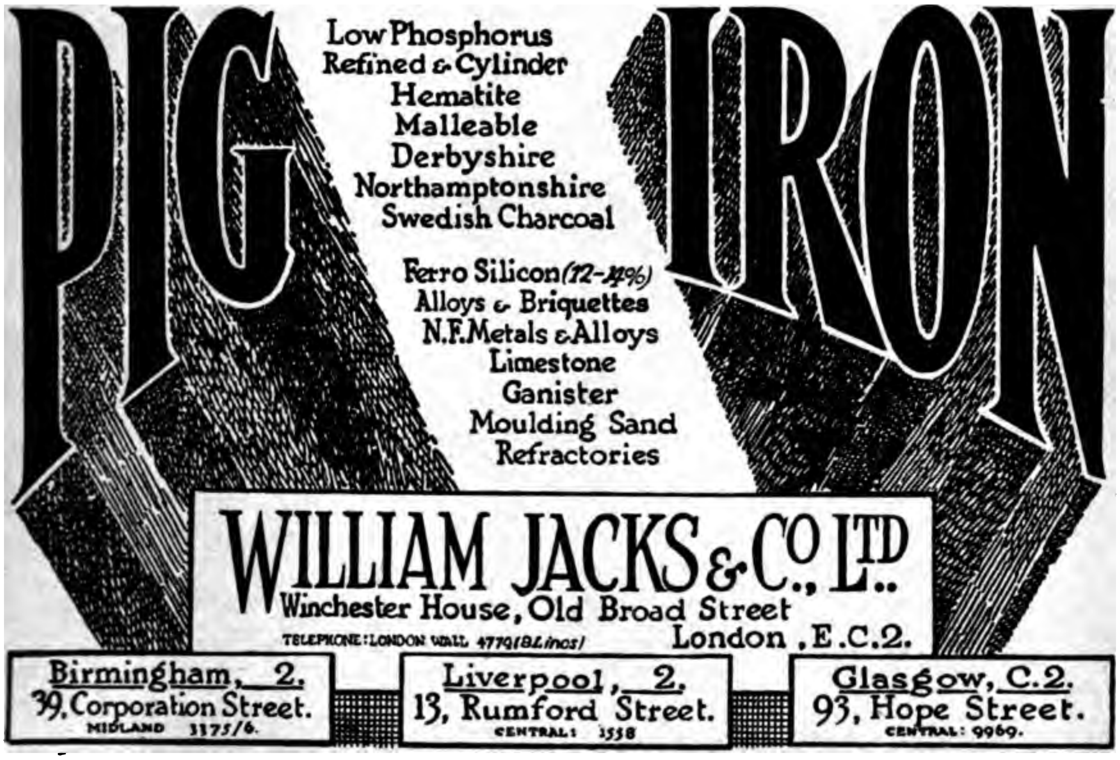

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American Letter

Potentialities of Sodium-silicate-bonded Sand*

It was decided to try to find out (*a*) whether or not sodium-silicate-bonded sands could be reclaimed, and (*b*) what could be expected in the way of dimensional accuracy from a sodium-silicate-bonded sand-mould. If this kind of sand had to be discarded after each cast, then sodium silicate as a bonding agent could well become completely uneconomic.

First Experiment

The casting chosen for the experiment (*a*) was a Steel Founders' Society of America standard test-block (see Fig. 1). The first sand mix contained 6-per cent. sodium silicate and 2-per cent. kaolin clay. An excellent casting resulted, but shake-out proved extremely difficult. The sodium silicate content was then lowered to 4 per cent. The castings from this sand mix were not 100-per cent. defect-free, but were good enough to be used for comparison with castings made from the same sand after reclamation. The 4-per cent. sodium silicate sand was then reclaimed in two different ways: (1) In a pneumatic scrubber, and (2) in an aerated muller. Twenty per cent. of new sand was added to each batch of reclaimed sand, reclamation by the pneumatic scrubber being done at the rate of 1,000 lb. per hr. in a two-compartment unit. Castings made after the fifth reclamation proved to be similar in appearance to the original new-sand castings. Similarly, the sand reclaimed by using an aerated muller produced castings of a similar surface appearance to the original castings, also after the fifth reclamation. It was concluded that sodium-silicate-bonded sands may be successfully reclaimed, using an aerated muller or pneumatic scrubber. However, it was also discovered that the sand must be physically crushed after shake-out to get the best results.

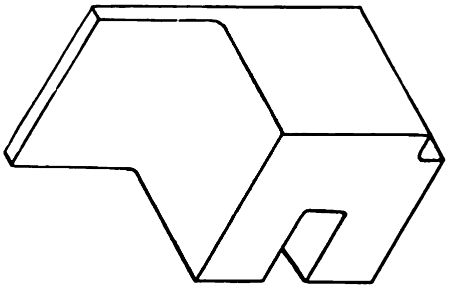

FIG. 1.—*Test casting used in sodium-silicate-bonded sand experiment (a).*

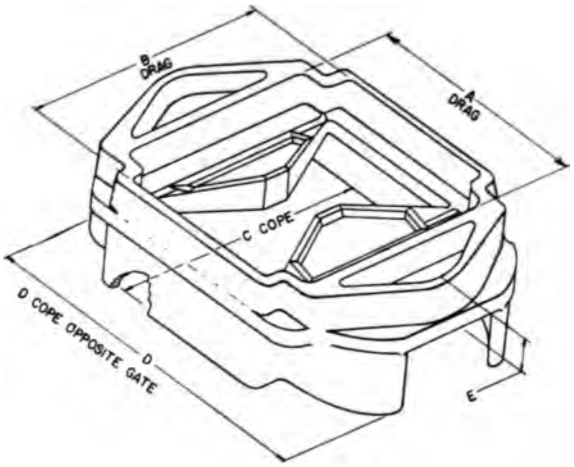

FIG. 2.—*Test casting used in dimensional accuracy experiment (b). Measurements were taken at five points, A to E.*

Second Experiment

Experiment (*b*) was an attempt to find what degree of reproducible dimensional accuracy can be obtained when using a sodium-silicate binder for the moulds of a fair-sized batch of production castings.

The casting used in the experiment is shown in Fig. 2. Eighty-four of these castings were made in sand moulds bonded with sodium silicate, and an equal number in green-sand moulds. Dimension A, on castings made in green sand, averaged 7.615 in. When all 84 readings were subjected to statistical analysis, the average variation encountered 95 per cent. of the time was ±0.028 in., whereas the variation in the case of sodium-silicate sand was only ±0.014, as is shown in the data in Table 1. It was therefore concluded that a sand-mould bonded with sodium silicate gave greater dimensional accuracy in the castings than an ordinary green-sand mould.

TABLE 1.—*Data obtained in the Dimensional-accuracy Experiment.*

Dimension.	Average variation.	
	Green-sand.	Sodium-silicate sand.
A	0.028	0.014
B	0.028	0.016
C	0.028	0.038
D	0.030	0.026
E	0.028	0.032

Cobalt-60 Radiography*

The traditional method of inspecting castings for internal defects in the authors' foundry was originally cutting, breaking and etching. Shrinkage voids usually constituted the largest part of sub-surface defects in the castings. Cobalt-60 radiography has helped improve the quality of the pearlitic malleable castings in the following way. The cobalt source, which was approximately the size of a pencil eraser, had the equivalent penetrating power of a 2-million volt X-ray machine, the gamma radiation reacting with film in the same way as X-rays. Gamma radiographs were used (*a*) to check new casting designs; (*b*) to design gating layouts, and (*c*) to establish standards for the inspection department.

For example, a small gasoline-engine crankshaft was usually made in pearlitic-malleable iron with two gates and feeders. A small tie-bar was required between the two counterweights, to prevent distortion during annealing. The two gates were combined in the form of an enlarged tie-bar, which could be removed with a milling operation, and experimental castings made in this manner were proved satisfactory very quickly by means of gamma radiographs. This small change resulted in a cost reduction of 2.3 per cent. The use of the cobalt-60 in this way has greatly reduced the time taken in the design development of parts, and has allowed sound casting techniques to be determined with a minimum of casting trials.

---

* From work done by George C. Warneke (National Malleable & *Steel Castings Company, Melrose Park Works*, Melrose Park, Illinois).

* From work done by A. J. Karam (central foundry division General Motors Corporation, Saginaw, Michigan).

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Book Reviews

Technologie der Giessereiformstoffe [In German], by Dr. F. Hofmann. Published by Georg Fischer, A.G., Schaffhausen, Switzerland. (120 pp., 20 ill.)

This book on the "Technology of Foundry Moulding Materials" can be described as a companion volume to another publication of the firm: *Sinn und Zweck der Formsandprüfung* (Aim and Purpose of Testing Moulding Sands), by W. Götz (127 pp., 52 ill., 1954). The earlier book deals with the use of various sand-testing equipment manufactured by Georg Fischer A.G. and the conclusions which can be arrived at from test results—in short—it explains "what to test and how to test" in relation to foundry sand.

The present book answers the question "why to test" and the first chapter, after explaining the relationship between average grain-size, degree of uniformity and A F S—grain-fineness number, gives directions for the correct choice of grain-size and grain distribution of moulding sands for given purposes. (There is a printing error in the second table on page 12, in the position of the headings: the multiplying factor and product should be reversed). It also indicates the desirable range of sand permeability for light-metal and copper-base alloy castings, for cast-iron, malleable iron and cast steel. A further chapter deals with fundamental and widely-different properties of conventional sand-binders, such as clay in natural and synthetic sands, organic binders for core-sands (oil, starch, resin), silesters for investment castings, resins for shell moulding and sodium silicate for the CO_2 Process. Finally, the effect of additions to the moulding sand of such materials as coal-dust, pitch and wood-flour, and the protective action of mould blackings are discussed.

O. P. Einerl.

Aluminiumguss in Sand und Kokille, Sixth Edition. (Sand and Die-cast Aluminium Castings) in German, by Dr. Roland Irmann. Published by Aluminium G.m.b.H., 29 Jagerhofstrasse, Düsseldorf, Germany; price DM 42.

This well known and justifiably widely-used book has now been thoroughly revised and brought up to date for its sixth edition. There has also been published a French version, ably translated by M. J. Moiroud. The new edition has maintained the general plan of the previous editions, but some parts have been shortened, partly because the information is available in other German publications, such as the *Aluminium Taschenbuch*, partly because these sections are not of specific interest to the founder—for instance the details of production of ingots from scrap.

The space thus gained has been devoted to a fuller treatment of recent developments in methods of melting and moulding which have been carefully covered and discussed and, where necessary, illustrated by photographs and drawings which are of the high standard of illustrations maintained throughout the book. The reviewer regrets the omission in this edition of the AID top-cast test-bar mould for the sole reason that—though perhaps somewhat antiquated—it is still in general use in this country.

There is still a scarcity of good introductions to light-metal founding suitable for the practical foundryman. No doubt Irmann's book is one of the best in existence.

E. Scheuer.

House Organs

Saunders' Magazine, Summer, 1959. Iss Saunders Valve Company, Limited, C Monmouthshire.

This magazine covers the activities of both and Goulds Foundries, Limited, and in connecti the latter there is an illustration of the ino entered into by Mr. William Gould in 187 founder of the company. There is also a report booklet of an exhibition of Frididaire products, Gould's foundry, with the commendable strengthening customer relations and su employees the uses made of the castings produc assembled by them. No doubt the employees' were asked to inspect the exhibits. The maga designed to interest both the employees and the customers—a not-too-easy task.

Staveley News. Vol. 8. No. 3. Issued by Staveley Iron and Chemical Company, Lim and the Sheepbridge Company, Limited, Chesterfield.

The main feature of this booklet (which is publ belatedly owing to the dispute in the printing ind is a story of a 1,300-mile tour of steelworks in Britain made by 15 young employees of the comp This magazine is meant for the employees, and as is a good example of its type. It announces *inter al* appointment of Mr. G. H. M. Smith as chief chem the Devonshire Works.

Sif-Tips, Vol. 25, No. 106. Issued by the Suffolk Foundry (1920), Limited, Stowmarket, Suffolk.

A normal feature of this publication, unlike m others dealing with welding, is that it is promine devoted to the repair of castings. In addition, in re years more and more use is being made of Sif-bro in manufacturing processes. Progress has been tinuous, and now 33 different Sif-rods are avail The booklet carries a number of illustrations of firm's materials being used, and for most of the it is stated what type of filler-rod was adopted.

New Catalogues

Special and Stainless-steel Castings. It is alw interesting to study foundry publicity emanating fr abroad, and an example recently received is a catalo from Marlyd, 6, Rue Albert-Lecocq, Le Perreux- Marne, Seine, France, covering precision castings m by the Shaw Process. The front cover of the catalo is particularly pleasing; the layout carries an interru vertical magenta-coloured band towards the left, and enclosed area, well balanced, indicates the compa lines of manufacture and the weight range. Abov white strip at the base, the lower half of the co carries a splendid picture of a number of typical c ings. The two inside pages are not so well laid-out some of the pictures are too small, whilst in the ch and use of type there is also room for improvemen

Chemicals. Albright & Wilson (Mfg.), Limited Knightsbridge Green, London, S.W.1, have publishe 26-page catalogue listing about 400 chemicals. T code number of each chemical is given, its formula, physical form and how it is packaged. The catalo will certainly make a valued addition to the refere libraries of both purchasing agents and chief chemi

Arc-welding Equipment. Rockweld, Limited, Co merce Way, Croydon, Surrey, has issued a 20-p well-illustrated catalogue covering Autopak arc-we ing equipment. This machine, which is portab carries innovations in respect to voltage control; it intended mainly for submerged-arc welding.

FOUNDRY

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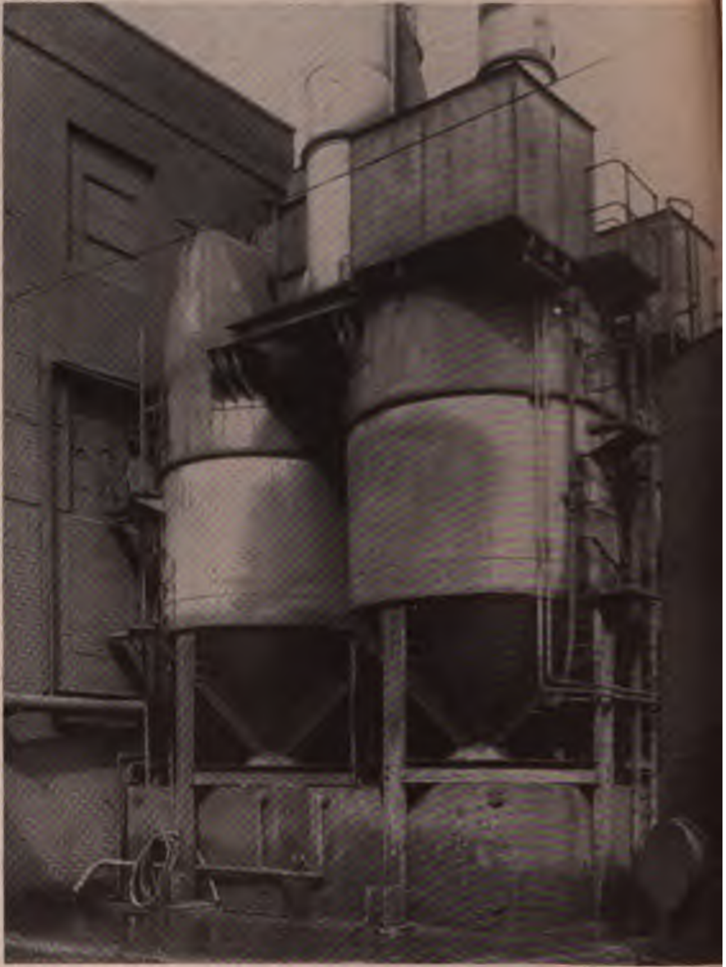

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FOUNDRY
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The Madrid Conference*

Over 1,400 foundrymen with their ladies came from all over the world to participate in the 26th Congress of the International Committee of Foundry Technical Associations. The organization for the reception of this large number of guests was extremely good, whilst the programme arranged for their instruction and entertainment was indeed praiseworthy. It is not generally realized how difficult is the preliminary work so to arrange technical sessions, committee meetings, works visits and social events that there are no clashes of personal interests within a reasonable number of days. The bulk of the work fell on the shoulders of Mr. Andres, who made light work of his Herculean task. The new system of paying an overall amount for the whole of the Congress functions introduces a task for the organizers to ascertain who will be attending what, so a control has to be imposed, without which very serious money losses would be incurred, as initially everybody has tickets for everything.

From the British point of view, this Congress sees the end of an era, for the secretariat of the International Committee—the sponsors—has been changed. Since the inception of the Committee in 1927, the secretariat has been in Manchester, from where both the late Mr. T. Makemson and, following him, Mr. G. Lambert, have served the organization well in an honorary capacity. Now, with a higher rate of subscription from members, the secretaryship (no longer to be honorary) is to go to Dr. P. W. Muller, of Zurich, Switzerland. Dr. Muller heads a firm of association management specialists of a similar type to Peat, Marwick, Mitchell or Heathcote and Coleman in this country. We wish Dr. Muller every success in his new appointment.

The Congress Banquet, at which over 1,000 guests were present, was a brilliant success, the service of the courses being carried through rapidly with almost military precision. Mealtimes in Spain are somewhat later than those to which most delegates are accustomed and an early dinner means a nine-o'clock start, but 11 o'clock is quite normal. Yet the morning functions start at nine or ten without anybody showing ill-effects from late nights. The British delegation at the Congress was very representative and included leading personalities from the iron, steel and non-ferrous founding industries and research. During the opening ceremony at which the speakers were Dr. A. Dacco, the president of the International Committee, Mr. Plana, president of the Congress, and the Minister for Industry, excellent simultaneous translation removed all the tedium of listening to speeches in an unknown tongue.

Madrid is a delightful city, having wonderful art-galleries, magnificent parks and a plethora of beautiful and magnificently sited buildings. Despite late hours and a full programme of technical and social events, the delegates enjoyed an unforgettable and satisfying experience.

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* See also page 308 of this issue.

Spanish Foundry Industry*

There are about 1,000 foundries in Spain, but many of them are quite small. In the last few years, several of them have been mechanized, some with British plant. There is a surprising number of steel foundries—something of the order of 50 or 60—a quite high figure for one of the lesser industrialized countries of Europe. Recently, there has been a visit to America by a Spanish foundry productivity team and much enthusiasm was aroused, of which the first expression is " great interest in management studies." This apparently is taking preference over research and perhaps even craft training in Spain, though it is understood that a new technical school has been established in Madrid, where the techniques of moulding and patternmaking will be taught. In Spain, also there are still quite a few lead foundries, casting gargoyles for churches.

The Spanish foundry industry is, in the writer's view, not too well organized, founders technical activities forming just a part of the national iron and steel institute. However, the ironfounders of Barcelona have an association—the Gremio—which is very active. There are no trade unions and the whole set-up is governed by *syndicates* which represent both employer and employed. One feature of this system is that redundant employees cannot be discharged, with the result that foundries tend to be overstaffed.

Yet the writer deems the Spanish foundry industry to be full of promise. It is, with others, at present being supported by American dollars and soon will have the right to import freely. Thus it is a market which should be studied by the British foundry-equipment industry.

The Spanish founders monthly magazine *Fundicion*, is achieving increasing status and is making a serious endeavour to increase its Mexican and South American reader coverage. Again, the circulation of the FOUNDRY TRADE JOURNAL in Spain is quite important and is, it is understood, much appreciated by the Spanish foundry owners on account of its practical approach to technical problems. Finally, it is clear that the Spanish foundry industry is alive to its needs and the only hindering factor at the moment is the lack of foreign currency—a feature which it is hoped will be short lived.

---

* From comment on the position and status of the foundry industry in Spain received in correspondence from the Editor of the JOURNAL, who is at present attending the International Foundry Congress in that country.

Correspondence

BISF MANAGEMENT COLLEGE

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—It was interesting to see the article on the British Iron & Steel Federation's Management College in your issue of September 24 (p. 218) and your representative's impressions confirm the great value which the steel industry attaches to this form of training. As a frequent speaker on these courses, the writer was struck by your representative's opinion that the existence of a National Foundry Craft Training Centre and the National Foundry College would make it " unnecessary for founders to follow this lead, as the existing system within the industry is *in every way adequate*."

One of the most profound changes in post-war industry has been the increasing complexity and responsibility of management. Apart from manufacturing knowledge and product development, the modern manager is forced to make decisions which, if soundly based, require acquaintance with such management tools as work-study, costing and cost control, labour relations, safety and training—to name but a few.

The foundry industry can legitimately be proud of the establishment of the National Foundry College so many years ago and of the preparation for management tasks which is given in its courses. Some years ago, the Council of Ironfoundry Associations' Training Committee set up short courses for foundry supervisors and foremen designed to improve the management skills of this important group of foundry management. They were initially considered an experiment but have now been established successfully and are widely used in the industry.

In a way this confirms that there exists a need for improving the skills of those who are already in management positions and whose further training does not fall within the sphere of existing institutions. In the writer's opinion there is a need for the further development of such courses not only in the steel but also in the foundry industry. They would need to be concerned with management training but firmly based on problems of the foundry industry rather than being as general in scope as the many existing courses provided by colleges and independent outside organizations.

It is open to question whether our industry could support a venture like the Management College of the steel industry, but surely it would be wrong to regard the existing facilities for the training of managers within the foundry industry as necessarily adequate.

For these reasons the writer differs from your representative's assessment of the situation, especially as he believes that greater efforts in this field would pay through improved efficiency and greater enterprise.—Yours, etc.,

F. C. HAYES,
Education and Training Officer.
Council of Ironfoundry Associations,
14, Pall Mall, London, S.W.1.

Forthcoming Events

OCTOBER 19

Institution of Production Engineers

Derby section : " What's New in Casting," by A. Short, 7 p.m., St. James's Restaurant, St. James's Street.

OCTOBER 20

Institute of British Foundrymen

Coventry section : Evening works visit to Fort Dunlop.

OCTOBER 21

Institution of Production Engineers

Halifax and Huddersfield section: " Productivity and Exports," by J. B. Scott, 7 p.m., at the Percival Whitley College of Further Education, Francis Street, Halifax.

Institute of British Foundrymen

London branch: " Specification Requirements for Gunmetal Castings," by F. Hudson, F.I.M., 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.

OCTOBER 22

Combustion Engineering Association

Western Region: Whole-day meeting commencing 10.30 a.m. with " Technical Application of Fuel-oil in Industry," by D. J. Heslop. Luncheon 1 p.m., followed at 2.15 p.m., by a film on " Cyclone Firing." Meeting will be held at the Royal Hotel, College Green, Bristol.

OCTOBER 23

Institute of British Foundrymen

Wales and Monmouth branch : " Foundry Costing," by W. E. Harrison, 7 p.m., at Llanelly Technical College.

OCTOBER 24

Institution of Production Engineers

London graduate section: Whole-day visit to Norton Grinding Wheel Company, Limited, Welwyn Garden City, Herts.

Institute of British Foundrymen

Bristol & West of England branch: " Some Aspects of Small Foundry Practice," by F. P. Robinson, 2.30 p.m., at the Central Technical College, Belmont Road, Exeter.

The Foundry Industry of the United Kingdom . . . . . . its Organization and Capacity*

(Slightly Abridged)

By A. R. Parkes

Foundrymen in other countries are seldom able to visualize the way in which the separate aspects of research, technology, and production are organized within the foundry industry of the United Kingdom. This paper is intended to clarify such matters for the benefit of international understanding. British founders have three establishments engaged on research, operating independently of each other, one for cast-iron, a second for steel, and a third covering non-ferrous metals generally. On the ironfounding production side alone, there are some 20 separate employers' associations, mainly dealing with groups of products and coming within the orbit of the Council of Ironfoundry Associations. Light-metal founders, steelfounders, copper-base and zinc-alloy founders have their own associations, as do the makers of non-ferrous ingots and pig-iron, and the suppliers of plant and equipment for the industry. Then there is the patternmakers association and a grouping of investment founders, both separately established. The set-up and inter-relation of all these associations is dealt with in this paper. Comments are included on the integration of the UK industry on the technical side with the Institute of British Foundrymen. The rôle of the Institute of Vitreous Enamellers as it affects foundry products is also mentioned, as are education and training and the specialized services rendered by organizations sponsoring increased usage of certain metals. A further purpose of the paper is illustration (by selected pictures) of some of the achievements of British foundrymen in recent years, and the recording of the industry's capacity and production statistics.

To those in whose minds are instilled the virtues of logic, the UK foundry industry may appear as an irrational agglomeration of constituent authorities. In this respect, it is different from most European countries—where there is usually one overriding directive authority—but is similar in some degree to foundry organization in the United States. However, despite the apparent lack of co-ordination, the UK system works well in practice and in the finality, actual results are the only true criterion of efficiency.

INTRODUCTION

The Author had some misgivings over the selection of the title for this Paper, as the use of the word "organization" may, when interpreted for a foreign audience, perhaps give the idea of a system of control such as is found in the military sphere, with severely regular and definite gradations of authority—from commander at the highest level to the humble infantryman at the lowest. This is quite wrong, for in the foundry industry of the United Kingdom there is no such central control or directive authority. Instead, there is in the UK a multiplicity of almost autonomous foundry associations, loosely integrated in certain specific and limited aspects. In having this loose set-up, the UK foundry industry is more like that of the United States than the foundry industries of the Continent of Europe, where there is often an overriding directive foundry authority. Thus, reduced to essentials, the word "organization" in this Paper must be understood to mean a diversification of activity within the industry, the very antithesis of singleness of control. Hitherto, foundry visitors or correspondents from other countries have often experienced considerable difficulty and confusion in making contact with their "opposite numbers" in Great Britain, whether for social or busines purposes or works visits. It is hoped that this paper will help them.

"Tied or Untied"

At the outset it must be pointed out that the foundry industry in the United Kingdom is regarded as being a completely separate undertaking from forge work or rolling or even the casting of ingots. The writer is aware that this is somewhat different from the meaning of the word "foundry" in many Continental countries, where it does in fact widely embrace steelworks, rolling and forging activities also. "Foundrywork" in the UK covers the melting of metal for castings, making of moulds or dies, cores, etc., and the pouring of metal into the moulds to produce shaped castings. After trimming and fettling, such castings are inspected and often passed for sale to engineering works for machining. Alternatively, of course, the castings may be passed from the foundry to machine-shops within the same works. In the latter case, the foundry is called a "tied" foundry and, naturally, concentrates attention on castings to be subsequently machined or built into finished goods sold by the company. A foundry which is not "tied" sells fettled castings on the open market. A realization of the co-existence of these two methods of production is necessary for the appreciation of different economic considerations governing the two types of foundries.

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* Paper presented by the Author at the first Congress of the Hungarian Foundrymen's Association, 1959.

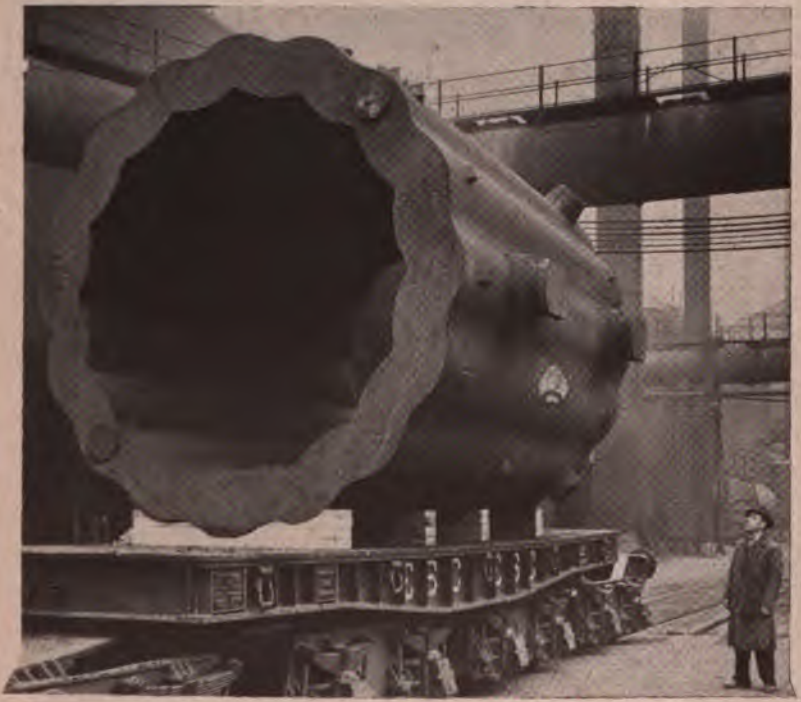
It must be pointed out—but briefly—that there is at present very little State ownership of foundries in the United Kingdom and the present political parties are widely divided in opinion on the advisability of extending State ownership of the UK iron and steel industry and with it the foundries. At present, the Conservative Party government, which has a majority in Parliament, is pledged to support free-enterprise in industry generally, whilst retaining nationalized operation of coal-mining, transport, and light and power undertakings. During the post-war government of the Socialist Party, a scheme was carried through in 1949 for the nationalization of the country's leading iron and steel works and with them the foundries "tied" to those works. When, however, at the general election in 1954 the Conservative Party regained control and the steel nationalization Act was revoked, the steelworks were placed in the hands of an intermediate body called the Iron & Steel Realization Agency. Since then, most of the iron and steel works have been re-sold to their original owners. In the early 'fifties, however, following the revocation of the nationalization of iron and steel, there was set up the Iron & Steel Board for the purpose of overall economic management of the iron and steel industry of the country on a very broad basis. In this Board is vested a loose control of major development schemes which have to do with the ironfounding industry.

It follows from the existing State control of UK coal-mining, rail, road, and water-transport organizations and light and power industries that any foundries attached to these—and there are some (chiefly amongst the railway undertakings)—are also State controlled. In wartime, too, many foundries were operated for, or by, the Ministry of Supply, but most if not all of these have now reverted to private ownership. Just one other example of a State-controlled UK foundry may be cited—that is, a foundry operated inside one of HM prisons!

Broad Inter-relationships

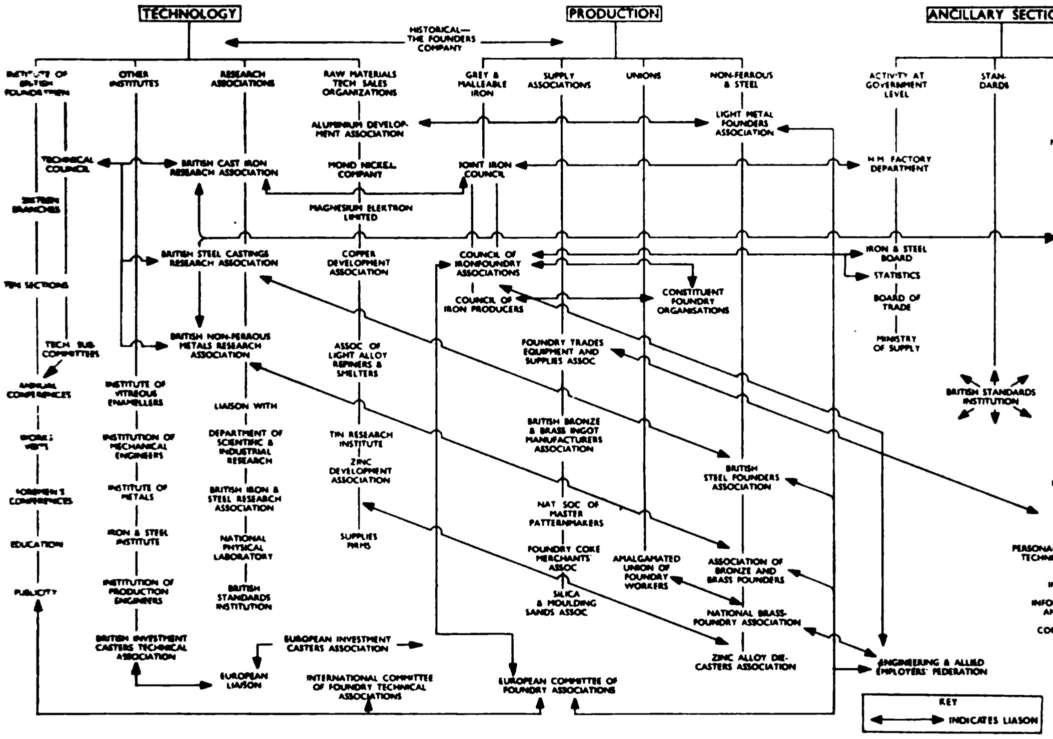
Table 1 sets out a basic conception of the UK foundry industry, which will be seen listed under two main kinds of activity, those of technology and production, with auxiliary headings to draw attention to contacts with Government departments and—not unimportant—the rôle of the technical Press. In some cases, lines of linkage have been drawn on the chart to indicate where and at what level integration exists between different associations within the industry. Not all of these liaisons can be shown in this way, however, as they would too much complicate the diagram, but it is hoped to elaborate these matters in the text referring to specific associations. Names of various foundry employer associations and technical and research bodies are shown in Table 2.

Finance for the operation of these associations and for research organizations is mostly levied from individual firms and, once again, there is no common method for doing this. In addition, approved research associations receive grants of money collected through the general taxation system of the country and disseminated for scientific purposes by the Department of Scientific and Industrial Research (DSIR). For association work, in some cases money is levied on a tonnage basis from constituent foundry members. In others, it is levied on a basis of productive-wages paid, and in yet further instances, fixed sums are payable irrespective of a concern's size.



Cast-iron ingot-mould weighing 150 tons, produced by the Brightside Foundry & Engineering Company, Sheffield.

TABLE 1.—*Diagrammatic Representation of Liaisons existing between Associations embodied in the UK Foundry Industry.*


TECHNOLOGY
PRODUCTION
ANCILLARY SECTIONS
HISTORICAL—THE FOUNDERS COMPANY
INSTITUTE OF BRITISH FOUNDRYMEN
OTHER INSTITUTES
RESEARCH ASSOCIATIONS
RAW MATERIALS TECH SALES ORGANIZATIONS
GREY & MALLEABLE IRON
SUPPLY ASSOCIATIONS
UNIONS
NON-FERROUS & STEEL
ACTIVITY AT GOVERNMENT LEVEL
STANDARDS
TECHNICAL PRESS
TECHNICAL COUNCIL
BRANCHES
TECH SUB COMMITTEES
ANNUAL CONFERENCES
WORKS VISITS
FOREMEN'S CONFERENCES
EDUCATION
PUBLICITY
INSTITUTE OF VITREOUS ENAMELLERS
INSTITUTION OF MECHANICAL ENGINEERS
INSTITUTE OF METALS
IRON & STEEL INSTITUTE
INSTITUTION OF PRODUCTION ENGINEERS
BRITISH INVESTMENT CASTERS TECHNICAL ASSOCIATION
BRITISH CAST IRON RESEARCH ASSOCIATION
BRITISH STEEL CASTINGS RESEARCH ASSOCIATION
BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION
LIAISON WITH
DEPARTMENT OF SCIENTIFIC & INDUSTRIAL RESEARCH
BRITISH IRON & STEEL RESEARCH ASSOCIATION
NATIONAL PHYSICAL LABORATORY
BRITISH STANDARDS INSTITUTION
EUROPEAN LIAISON
EUROPEAN INVESTMENT CASTERS ASSOCIATION
INTERNATIONAL COMMITTEE OF FOUNDRY TECHNICAL ASSOCIATIONS
ALUMINIUM DEVELOPMENT ASSOCIATION
MOND NICKEL COMPANY
MAGNESIUM ELEKTRON LIMITED
COPPER DEVELOPMENT ASSOCIATION
ASSOC OF LIGHT ALLOY REFINERS & SMELTERS
TIN RESEARCH INSTITUTE
ZINC DEVELOPMENT ASSOCIATION
SUPPLIES FIRMS
JOINT IRON COUNCIL
COUNCIL OF IRONFOUNDRY ASSOCIATIONS
COUNCIL OF IRON PRODUCERS
FOUNDRY TRADES EQUIPMENT AND SUPPLIES ASSOC
BRITISH BRONZE & BRASS INGOT MANUFACTURERS ASSOCIATION
NAT SOC OF MASTER PATTERNMAKERS
FOUNDRY COKE MERCHANTS' ASSOC
SILICA & MOULDING SANDS ASSOC
EUROPEAN COMMITTEE OF FOUNDRY ASSOCIATIONS
CONSTITUENT FOUNDRY ORGANISATIONS
AMALGAMATED UNION OF FOUNDRY WORKERS
LIGHT METAL FOUNDERS ASSOCIATION
BRITISH STEEL FOUNDERS ASSOCIATION
ASSOCIATION OF BRONZE AND BRASS FOUNDERS
NATIONAL BRASS-FOUNDRY ASSOCIATION
ZINC ALLOY DIE-CASTERS ASSOCIATION
H M FACTORY DEPARTMENT
IRON & STEEL BOARD
STATISTICS
BOARD OF TRADE
MINISTRY OF SUPPLY
BRITISH STANDARDS INSTITUTION
ENGINEERING & ALLIED EMPLOYERS' FEDERATION
REPORTS OF NEW DEVELOPMENT
REPORTING RESEARCH
STATISTICS
NEW MATERIALS AND PLANT DESCRIPTIONS
PERSONAL, COMMERCIAL AND TECHNICAL INFORMATION
PATENTS INFORMATION
INFORMED COMMENT AND GUIDANCE
CORRESPONDENCE
KEY
INDICATES LIASON

Historical Note

The oldest organization associated with the UK foundry industry is the Worshipful Company of Founders. Its records go back to the year 1275, and obviously used to be an association of master-men concerned with non-ferrous founding. It is one of the 80 or so City Livery Companies which were once an integral part of the government of the City of London. Up to comparatively recent years, the Founders' Company had the duty of stamping sets of weights to guarantee their accuracy and conformity with the law of the land—a duty now undertaken by the Board of Trade. To-day, the membership of the Founders' Company includes only about 25 per cent. of men drawn from the actual foundry industry, the rest being business and professional people.

EMPLOYERS' ASSOCIATIONS

In the earlier remarks, it is hoped that a rough idea of the place of the foundry industry in the country's social and economic scheme has been given and the statistics quoted in Tables 3, 4 and 5 should add substance to the broad outlines reported. In addition, these figures give an overall view of the productive capacity of the UK foundry industry.

Ironfounding

Foremost and largest amongst the UK groupings of foundry employers are those which cover ironfounding. On a size basis, the ironfounders in the UK account for a production of 3¾ million tons of grey and malleable iron castings annually from a total personnel of about 138,000. As will be seen from Table 2, there are groupings of employers' associations: (*a*) according to category of iron castings produced and (*b*), for those not so covered, according to the district in which the foundry premises are situated. Over 80 per cent. of the UK ironfoundry firms, no matter to which group they belong, are now represented by the Council of Ironfoundry Associations (CFA). Nowadays, the Council comprises 15 full-member associations (see Table 2), including one large federation (National Federation of Engineering and General Ironfounders) which itself is constituted to represent two other federations (Ironfounders National Confederation (INC) and the National Ironfounding Employers Federation (NIEF)).

The UK producers of pig-iron—to be used for foundry purposes as distinct from steelmaking—have organized themselves into the Council of Iron Producers (CIP). This association and the CFA, which in fact represents consumers of pig-iron, together form the Joint Iron Council, founded in 1945.

It follows that the Joint Iron Council and its constituent associations embrace all sections of the UK ironfounding industry. The total membership is about 1,100 firms out of a total of 1,750 separate firms in the UK which practice ironfounding. Through the JIC, producers and users of pig-iron work together, (using a secretariat housed centrally in London) on all matters affecting common interests, excepting negotiations on wages and conditions of labour-hire and casting selling-prices.

The money required to finance the organization of the JIC and—through it—about two-thirds of the cost of maintenance of the British Cast Iron Research Association—as well as substantial contributions made to the Institute of British Foundrymen (about £2,000 per annum), the National Foundry College and the National Foundry Craft Training Centre—is provided through a levy of a shilling or so per ton of pig-iron used in foundries. This levy is made with Government approval.

British Steel Founders' Association

In December, 1944, all the then-existing associations of steelfounders were brought under the British Steel Founders' Association (BSFA), which became the only representative organization of the British steelfounding industry as a whole. It has the avowed intention of meeting post-war problems by passing onto customers the full benefit of constant technical progress whilst, at the same time, establishing a maximum degree of security for all concerned in the industry, by ensuring a margin between selling price and cost of production adequate to yield a reasonable profit, in addition to financing capital replacement, development and research on a proper scale. In 1951, the BSFA was finally established in its own independent headquarters in Sheffield.

Structure of the Association

The BSFA is a voluntary and unincorporated body comprising either as full members or affiliated makers, nearly all the major producers of steel castings in the United Kingdom; it represents over 80 per cent., by volume of production, of the industry; it imposes no pressures or sanctions other than those of good faith and goodwill between members; it is fully democratic and, by means of a well-devised committee structure, provides for the continuous adjustment of association policy to changing circumstances and the intentions of members. To defray the cost of the secretariat and other work in which the Association is involved, finance is collected from member firms on the basis of a levy per ton of castings produced which come under the scope of the Association.

Fields of Activity

As good design is more than ever necessary for the correct functioning of a casting made in steel, it is the policy of the BSFA to create an atmosphere of confidence and consultation on design, etc., between founders and users of steel castings. This is accomplished through the medium of customer founder conventions—special meetings arranged with particular classes of customer—and through educative literature. The Association has also issued a series of booklets drawing attention to the possible applications and fields of use in which steel castings are preferable to other materials and where founding is better than any other method manufacture. The Association has set up a

TABLE 2.—*Principal Technical, Research, Employer and Employee Associations of the UK Foundry Industry (names and addresses of branch and section secretaries published at monthly intervals in the* FOUNDRY TRADE JOURNAL).

EMPLOYERS' ASSOCIATIONS

Ironfounding

- Joint Iron Council (secretariat, 14, Pall Mall, London, S.W.1).
- Council of Ironfoundry Associations (14, Pall Mall, London, S.W.1).
- Association of Automobile and Allied High-duty Ironfounders.
- British Ironfounders' Association.
- British Bath Manufacturers' Association.
- British Malleable Tube Fittings Association.
- Cast-Iron Chair Association.
- Cast-Iron Axlebox Association.
- Cast Iron Heating, Boiler and Radiator Manufacturers' Association.
- Cast Iron Pressure Pipe Association.
- Cast Iron Segment Association.
- Greensand Pipe Founders' Association.
- National Association of Malleable Ironfounders.
- National and Midland Ironfounders Association.
- Roll Makers Association of Great Britain.
- National Ingot Mould Association.
- National Federation of Engineering and General Ironfounders.
- Ironfounders' National Confederation (branches in East and West Ridings; London, Home and Eastern Counties; Midlands and North Midlands; North Western).
- National Ironfounding Employers' Federation (branches in Leeds and district; Leicester and district; Liverpool and district; Manchester and district; Monmouthshire (including Cardiff and district); North of England; North Staffordshire; Scottish Ironfounders' Association; Sheffield and district; South of England; Welsh Engineers' and Founders' Association; West of England; West Riding).
- Council of Iron Producers.
  - Cylinder and Refined Iron Association.
  - Foundry, Pig Iron Producers' Association.
  - National Association of Hematite Pig Iron Makers.
  - Scottish Ironmasters' Association.
  - South Staffordshire Iron and Steel Association.

Steelfounding

- British Steel Founders' Association (secretariat, Broomgrove Lodge, 13, Broomgrove Road, Sheffield 10).

Brassfounding

- Association of Bronze and Brass Founders (secretariat, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham 15).
- National Brassfoundry Association (secretary, E. N. Hiley, 4, Calthorpe Road, Five Ways, Edgbaston, Birmingham 15).

Light Metal Founding

- Light Metal Founders' Association, 69, Harborne Road, Edgbaston, Birmingham 15.
- Association of Light Alloy Refiners and Smelters (ALAR), 3, Albemarle Street, London, W.1.

Equipment and Supplies

- Foundry Trades' Equipment and Supplies Association, 94/98, Petty France, London, S.W.1.
- National Society of Master Patternmakers (secretariat, Fisher and Firkins, 12, Cherry Street, Birmingham 2).
- Silica and Moulding Sands Association (secretary, G. K. Timperley, 30, Gordon Street, London, W.C.1).
- British Grit Association (secretary, J. Campbell MacGregor, 10, Bank Street, Airdrie, Lanarkshire).
- Foundry Coke Merchants Association (secretary, S. Owen, Exchange, Birmingham).
- National Federation of Scrap Iron, Steel and Metal Merchants (secretary, L. H. Cryer, 33, Chancery Lane, London, W.C.2).
- British Bronze and Brass Ingot Manufacturers' Association (secretariat, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15).

Technical and Research

- Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3.
  - *Branches:* Australia (Victoria); Birmingham, Coventry and West Midlands; Bristol and West of England; East Midlands; Lancashire; Lincolnshire; London; Newcastle-upon-Tyne; Scottish; Sheffield; Tees-side; Wales and Monmouthshire; West Riding of Yorkshire; South Africa.
  - *Sections:* Bedfordshire Hertfordshire; Coventry and district; East Anglia; Falkirk; North East Lancashire; Northampton and district; Scottish North Eastern; Slough; Southampton; Stoke-on-Trent; West Wales.
- British Cast Iron Research Association, Alvechurch, Birmingham, and Scottish laboratories at Blantyre Industrial Estate, Blantyre, Lanarkshire
- British Non-Ferrous Metals Research Association, 81/91, Euston Street, London, N.W.1.
- British Steel Castings Research Association, East Bank Road, Sheffield 2.
- British Investment Casters' Technical Association (secretary, J. Bolton, East Bank Road, Sheffield 2).
- Zinc Alloy Die Casters Association, 34, Berkeley Square, London, W.1
- Institute of Vitreous Enamellers (secretary, J. D. Gardom, Ripley, Derby)

EMPLOYEE ASSOCIATIONS

- Amalgamated Union of Foundry Workers of Great Britain and Ireland (incorporating National Union of Foundry Workers, Ironfounding Workers Association, and United Metal Founders Association), 164, Chorlton Road, Brooks's Bar, Manchester 16.

Committee on Industrial Health, under the ice of which a special mobile X-ray service en formed. All workpeople at the risk of itory diseases in members' steel foundries ius have an opportunity of having full-size plates of their chests taken, the objective to enable the detection of incipient lung es at the earliest possible moment. In addition, ssociation has developed the Micro-filter itor, believed to be the most efficient and rtable prophylactic device of its kind. The ation also organizes periodical conferences rks medical officers.

er aspects of BSFA work include the main- e of a central statistical and information ment, which collates and circulates exclusively mbers information relating to the working of dustry, markets, productive capacity, prices, er, costs, and other relevant features.

sociation of Bronze and Brass Founders

far as can be ascertained from reliable direc- , there are about 1,000 foundries in the United om which produce castings in copper-base rrous metals. As is usual in many countries, operate from a wide diversity of sizes of shments and the products themselves are pro- sometimes by hand methods and sometimes in -mechanized installations. It is currently ed that 80 per cent. of brass and bronze ies employ fewer than 50 men, but that cent. of the total annual production tonnage from the activities of but 200 foundries rly, with regard to membership of the manu- ers' association representing this section of dustry, the total membership of the Associa- f Bronze & Brass Founders (ABBF) at 120 is reported to account for over 60 per cent. tonnage of castings produced in the very ange of copper-base alloys commonly used.

ABBF, like the ironfounders' association, et up during the 1939-45 war, to act as a ate committee to represent the interests of and bronze founders in negotiation with nment departments. A firm of professional ries, Heathcote and Coleman of Birming- having an accountancy background, were ited and constitution and membership rules drawn up—at the first meeting, 46 of the most prominent in brass and bronze founding to become members. Full membership is to any foundry firm producing castings ning not less than 50 per cent. copper. Each a president and vice-president and a Council are elected from among the members. ns of the Association operate in London and me Counties, Midlands, Scotland, Lancashire orth West, and Yorkshire and North East.

ike ironfounding, for brass and bronze ers there is no Government-approved cash n ingot metal to support the activities of ssociation. Instead, full members of the iation (following a nominal entrance fee) bute to a common fund established for rposes of Association work. In addition, there is an associate-member grade, with fewer privileges and reduced subscriptions.

Valve-block casting for Borg-Warner automatic transmission, pressure-die-cast by High Duty Alloys, Limited, Slough, in LM 2M (Hiduminium) alloy. It weighs 3½ lb. and measures approx. 8 in. square.

In brief, the seven main objectives of the ABBF are (*a*) to represent the industry in negotiations with Government departments, in the matter of trade regulations, etc.; (*b*) to render mutual assistance on technical and production problems (inspection procedures, specifications, and raw materials); (*c*) to further the extension of trade in products covered by the Association; (*d*) by co-operative action to avoid uneconomic and wasteful competition; (*e*) to co-operate with similar organizations, and (*f*) to protect the interests of members where and if necessary.

Technical service to members is extremely practical; it ranges from providing instruction and information on shell mounding[2] to formulation of revisions of the cast copper-base specifications (BS 1,400). Metal losses in melting, operating costs in melting, a survey of the CO_2 Process[3], a furnace survey, and the issue of an explanatory handbook to accompany the BS 1,400 specifications, are among other topics in which help and advice have been made available. The ABBF is also represented on the European Committee of Foundry Associations.

Zinc Alloy Die Casters' Association

Although the name suggests that the activities of the Zinc Alloy Die Casters' Association (founded in 1942) are confined to foundries using the die-casting process (and particularly pressure-die-casting) to produce castings in zinc-base alloys, the Association actually has a much broader coverage. Most of its member-firms also die-cast aluminium alloys and some also die-cast the yellow metals, so that it might be said that the Association generally covers most aspects of UK die-casting—acting on behalf of company members, in conjunction in certain instances with the Light Metal Founders' Association (LMFA), which has itself a die-casting committee.

The purposes of the ZADCA, which like most other UK founders' associations is a non-profit making concern, can be summed up in the words: To promote members' business interests, to co-operate with Government departments and to disseminate technical knowledge. In addition to drawing up rules of good practice, conditions of sale, the Association's objective is also *to consider means to avoid uneconomic competition, but not to endeavour to monopolize trade or commerce in a manner likely to suppress healthy competition or hinder technical progress.*

This last is important, for it represents the present-day status of UK manufacturers' associations, *vis a vis,* the "Monopolies and Restrictive Practices Act" recently introduced into UK legislation. In brief, the Act is designed to prevent grouping of manufacturers having the objective of forming monopolies either on a price or distribution basis, the activities of which are not in the public interest.

So long as a firm has been die-casting zinc alloys for at least three years, it is eligible for membership of the ZADCA, which is itself an offshoot of the Zinc Development Association (ZDA)—an organization maintained by manufacturers of primary zinc metal. Full membership of ZADCA is confined to those UK die-casting firms catering for the general market. Administration of the Association is organized through the joint secretariat of ZDA, housed at 34, Berkeley Square, London, W.1.

The Zinc Alloy Die Casters' Association has two major avenues of service to members. These are (1) the issue of a wide range of publicity (*a*) directed to help members in their technical problems and (*b*) to assist in propagating the sales of castings, (2) introduction of a quality label for members' castings in conjunction with the British Standards Institution—a manifestation of the BSI "Kite Mark" scheme for finished goods certification. Another service—and in this respect also the ZADCA is of help to die-casters generally—is the issue of unified "Conditions of Sale" for use by the trade.

LMFA and NBA

Two further employers' associations serve the interests of the UK non-ferrous foundry industry. These are the Light Metal Founders' Association (LMFA) (which has the services of Heathcote and Coleman of Birmingham for its secretariat), and the National Brassfoundry Association (NBA) with Mr. E. N. Hiley, 4, Calthorpe Road, Five Ways, Edgbaston, Birmingham, as its secretary.

The LMFA naturally serves the general interests of sand founders, gravity-die-casters, and pressure-die-casters of aluminimum and magnesium-base alloys. As the output of these sections of the UK foundry industry (and especially pressure-die-casting) is growing quite rapidly, it is clear that increasing activity can be expected in the employers' association in the future.

The National Brassfoundry Association, which has been in existence over 100 years, is different from other foundry associations in at least two respects, *i.e.,*

Four-blade propeller casting (22 ft. dia.) made in Novoston alloy (high-strength copper-base alloy). The casting is being lifted from its cement/sand mould at the foundry of J. Stone & Company (Charlton), Limited; it weighed 42 tons as cast and 31½ tons as machined ready for fitting to the ship.

*casting, weighing 164 tons,
rolling-mill housing, cast
Sheffield steelfoundry of
h Steel Castings Corpora-
Measuring 32½ by 16 by
. it needed 205 tons of
steel for casting.*

the UK the name "brass-
ry" includes the produc-
f hot-brass-pressings such
mbers' brassfoundry, gas-
s and the like—in addition
stings made in sand and
2) This Association under-
the responsibility of acting
s membership collectively
egotiations with trade
s, both direct and in con-
vith the Engineering and
Employers' Association.
of the best-known post-
ctivities of the NBA was
—in conjunction with the
—it organized a joint
ctivity Team to visit selected brassfoundry
ishments in the USA. On its return, the team
hed an extremely valuable report[4] of its
gs.

EMPLOYEE ASSOCIATIONS

foundry trade-unionism has this year been
ntinuous existence for 150 years, a remark-
achievement and one of which organized
ry workers are quite proud. In 1943, the
dry Union then constituted was strengthened
algamation with the Scottish Brassmoulders'
and the Associated Iron, Steel and Brass
ers of Scotland. At the same time, the con-
on was amended to enlarge its organizing
and to set up machinery through which
ts, branches, and rank-and-file members
be brought into more active participation in
airs. Amalgamation with the Ironfounding
ers' Association and the United Metal
ders' Society in 1946, resulted in the setting
the present Amalgamated Union of Foundry
ers.

wadays, the status of the Union as a respon-
negotiating body on wages and conditions of
yment is well established and, on the whole,
ations with employers are carried on in a
ly atmosphere. Here, the employers' nego-
body is, in the main, local branches of the
eering and Allied Employers' Association
office, 22, Essex Street, London, W.C.2).

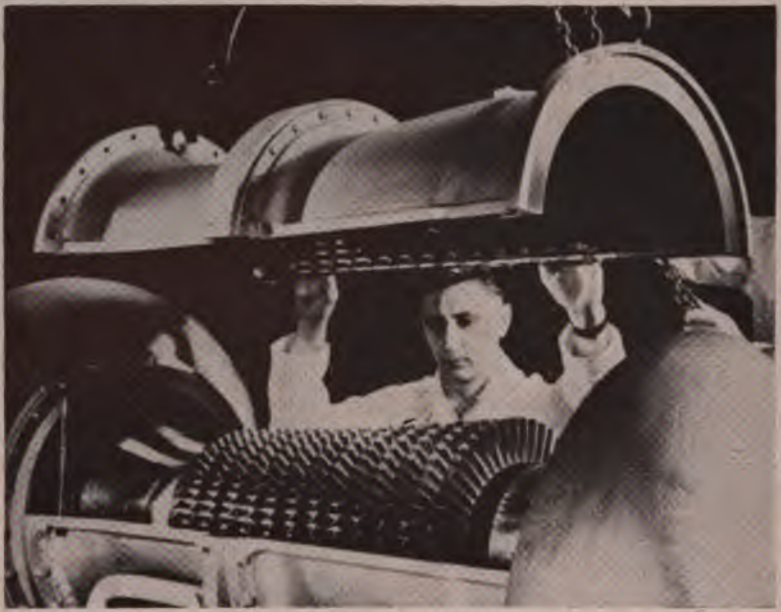
Union organizes local and general meetings
s members throughout the year and, in ad-
holds a "Summer School" for representa-
from each district. In addition, periodic
abroad are made to inspect foundries and
working conditions in other countries.
tly, a delegation of this type visited foun-
in Czechoslovakia. Membership figures for
the Amalgamated Union of Foundry Workers are currently quoted as about 72,000.

RESEARCH ASSOCIATIONS

It is proposed next to review the set-up and *modus operandi* of separate research bodies working for the UK foundry industry, not, however, including sponsored work carried out at universities.

British Cast Iron Research Association

One of the first organizations to be set up in the UK to carry out co-operative industrial research on a modern team- or group-basis (following the formation of the Department of Scientific and Industrial Research (DSIR) at the close of the 1914-18 war) was the British Cast Iron Research Association, founded in 1921. It acquired its first laboratory in 1924, but for many years its progress (though fundamentally sound and very worthwhile) was retarded somewhat by lack of funds. In 1940, the BCIRA premises in Birmingham were damaged by enemy action and, in 1942, it moved to its present "home" covering 35,000 sq. ft. at Bordesley Hall, Alvechurch, near Birmingham. Since that period, the Association has grown more rapidly in status and value to the ironfounding industry and now employs about 150 full-time personnel (118 scientifically trained), maintaining also a service laboratory in Scotland. The BCIRA was responsible for the very large amount of basic research which preceded the first announcement to the world—made by the head of its research team, Mr. H. Morrogh, in 1948—of the successful production of as-cast spheroidal-graphite cast-iron. This development, based on small additions of cerium to iron of suitable composition, was quickly followed by news of further successes using magnesium, with the result that a most valuable addition to the "family" of cast metals was created.



Spheroidal - graphite - ir
pressor casing for a R
Hornsby gas-turbine eng
duced by Birmidal I
ments, Limited.

Finance

Until 1948, the BCIRA was supported by direct contributions from a relatively small number of member-firms amongst the 1,750 or more iron foundries in the country. These total subscriptions were supplemented in the early years by an equal contribution from the country's general taxation revenue, arranged through the DSIR. A major change in financial backing was brought about in 1948 by the Joint Iron Council (JIC) which, acting on behalf of the Council of Ironfoundry Associations (representing ironfounders) and the Council of Iron Producers (representing foundry pig-iron makers) assumed responsibility for paying to the Association a substantial proportion of the funds collected from ironfounders by the Pig-iron Levy. Under this arrangement, the Association now has a total income of the order of £200,000 per annum, and every ironfoundry in the United Kingdom is entitled to full membership.

Services to Industry

The Association functions through four main divisions: (1) Research Department; (2) Development Department; (3) Intelligence Department, and (4) Operational Research Team, the spheres of activity of which are obvious from the titles. In
addition to extensive me
cal, sand research an
process research, the
tion has several other im
responsibilities to ironfo
For example, the foundr
spheres branch of the D
ment Department of the
established in 1951, ha
concerned with an ind
applicable method of con
dust generated at
grinders, and a device
available commercially.
work has been done on t
tilation of the foundry
out, and on many other
of improvement in worki
ditions[5] in relation to th
tion of the Iron and Steel Foundries Regul
1953[6], referring to dust and fumes (in f
from January, 1956).

An Operational Research Team was set
the Association in 1950 to advise ironfoun
means of improving production efficien
thereby increasing productivity.

The BCIRA Intelligence Department is
sible for all those services to members that
on an up-to-date supply of information (in
the resources of an excellent library), and
ponsible for the preparation of all materi
lished by the Association, including the
Journal, Bulletin and Foundry Abstracts,
Journal of Research and Development.

(*To be continued.*)

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[1] For example, "Rylands Directory of the Coal, Iron, Steel,
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[2] ABBF, "Interim Report" and "Second Report on
Moulding Process," by J. L. Rice, B.Met. (publication nu
and 476 of the British Non-Ferrous Metals Research A
81/91, Euston Street, London, N.W.1).

[3] ABBF, "Survey of the CO_2 Process for Core and Mould
(publication number 471 of the BNFMRA).

[4] "The Brass Foundry," published by the Anglo-Americ
on Productivity, 21, Tothill Street, London, S.W.1.

[5] "Garrett Report." Report of the Joint Advisory Con
Conditions in Iron Foundries, published by HM Station
York House, Kingsway, London, W.C.2.

[6] "Iron and Steel Foundries Regulations, 1953" (SI
published by HM Stationery Office.

J. A. PRESTWICH INDUSTRIES, LIMITED—Mr. Herbert Clark has retired from the board.

THOMAS BLACKBURN & SONS, LIMITED—Mr. Richard J. Fletcher has been appointed a director.

FERRANTI, LIMITED—Mr. E. Grundy, Mr. J. Prince, and Mr. O. M. Robson have been appointed to the board.

BELMOS COMPANY, LIMITED—Mr. Thomas Coughtrie, chairman and managing director, has resigned from the latter position and is succeeded by Mr. George Coughtrie, his son.

LAYCOCK ENGINEERING, LIMITED—Mr.
Walker and Mr. Eric Thompson have been a
joint managing directors of the company, wh
member of the Birfield group.

MATHER & PLATT, LIMITED—Mr. William L
will become chairman on April 1, 1960, in s
to Mr. L. E. Mather, who is to retire from t
on the previous day. Mr. William Mather,
been a director of the company since 1947,
director of Rustyfa, Limited, and member of
mittee of the Russo-British Chamber of Com

nnual General Meeting

ual general meeting of the British Stan-
on held in London, Mr. R. E. Huffam
for a second term of office as the Insti-
dent. Mr. Huffam who was until his
ment, United Kingdom co-ordinating
nilever, Limited, also holds office as
BSI's General Council. Also re-elected
ee deputy-presidents of the Institution,
ncalfe; Sir Herbert Manzoni (City Engi-
ngham); and Mr. John Ryan (vice-chair-
Box Company, Limited). Among mem-
divisional councils elected to serve on
ouncil were, from the engineering divi-
F. Alcock (chairman and managing
nslet Engine Company, Limited), Mr.
bell (Merz & McLellan) and Mr. S. E.
ctor and chief engineer, W. T. Henley's
orks, Limited). From the codes of prac-
Mr. H. N. Pemberton (chief engineer
yd's Register of Shipping) was elected.

Review of the Year

the BSI's annual report, Mr. Huffam
the 1,000 projects for new or revised
ards now in hand and spoke of the
and continuing endeavour" going on all
BSI's 2,800 technical committees. The
standards departments in firms was in-
said, and the annual conferences of
gineers were growing in popularity. There
trong move to link the activities of such
some form of association.

port side he spoke of the desirability of
nslations of British Standards for markets
of South America. "We hope that other
ill follow the example of the iron and
y which has had prepared in conjunction
eries of summary sheets in five languages
steel standards," he added.

m then highlighted some of the activities
in technical divisions and *inter alia* he
engineering co-ordination and rationaliza-
standards for steel and non-ferrous metals
ding. Revision of the standards for alloy
minium pressure vessels was in hand with
tion being paid to the possibility of reduc-
f the factors of safety which had been
too high.

ded by saying that the Council for codes
was making steady progress. An investiga-
rrosion of steel structures was to be carried
important draft code on the guarding of
ad been circulated for comment.

Board Changes

RITISH LOCOMOTIVE COMPANY, LIMITED—
d L. G. Lindley has been appointed a
Mr. J. T. Fleming has resigned from the

OLS, LIMITED—Mr. S. A. Roberts has been
anaging director. He joined the company
s general manager and became deputy
irector in 1956.

BAIRD & COMPANY, LIMITED—Mr. Thomas
croft has been appointed chairman and
A. Lumsden, of Maclay, Murray & Spens,
f Glasgow, has been appointed a director.

Management Conference

Many aspects of management will be discussed at the 14th national conference of the British Institute of Management to be held in Harrogate from Tuesday, November 17, to Thursday, November 19. The United States Ambassador, Mr. John Hay Whitney, will open the proceedings and papers will include "Private Enterprise in a 'Family' of Firms" by Mr. Peter Ryder, M.B.E. (managing director, Thomas Tilling, Limited); "Changing Pattern of Consumer Spending" by Dr. Mark Abrams (managing director, Research Services, Limited); "Selection of Senior Staff" by Mr. H. Roff (managing director, Management Selection, Limited) and Mr. B. Ungerson (group personnel manager, Littlewood's Mail Order Stores, Limited); "Reaction of the Trade Unions to Automation" by Mr. J. A. Birch (general secretary, Union of Shop, Distributive and Allied Workers); "Management Approach to Standardization and Simplification" by Mr. H. A. R. Binney (director, British Standards Institution); "Expansion" by Mr. Brian A. Maynard, F.C.A.; "Resistance to Change in a Large-scale Organization" by Mr. C. T. Brunner (a director of Shell-Mex and B.P., Limited); "Second Thoughts on Management Organizations" by Professor Norman C. Hunt, B.COM., PH.D. (Department of Organization of Industry and Commerce, Edinburgh University); "Management and the Human Sciences" by Miss Nancy Seear (London School of Economics); "Employees' Shareholding" by the Right. Hon. Lord Shackleton of Burley (John Lewis & Company, Limited); "The Discriminating Consumer" by Mr. Casper Brook (director, Consumers' Association) and "Production Problems in the Smaller Company" by Mr. B. M. Harris (managing director, Gerard Bros., Limited). Lord Bailleu, president of the Dunlop Rubber Company, will be the speaker at the closing dinner.

Power-Gas Trading Re-organization

Earlier this month, the trading activities of the Power-Gas Corporation, Limited, Stockton-on-Tees, were taken over by two wholly owned subsidiaries, Ashmore, Benson, Pease & Company, the directors of which are Mr. W. R. Brown (chairman), Mr. C. E. Wrangham (vice-chairman), Mr. T. K. Hargreaves (managing director), Mr. C. Robson, Mr. D. M. R. Brown, and Mr. R. P. Key, and which will control the Stockton works, and P. G. Engineering, Limited. The board of the latter company consists of Mr. W. R. Brown (chairman), Mr. C. E. Wrangham (vice-chairman), Mr. R. W. Rutherford (managing director), Mr. P. M. K. Embling (general manager), Mr. C. Robson, Mr. C. Ingham, and Mr. T. H. Riley.

P. G. Engineering will undertake the design and supply of plant and equipment to the chemical, gas, and petroleum industries, and also engineering contracts of a general character.

A NEW COMPANY—Associated Electrical Industries South Africa (Pty.), Limited—will take over the assets and liabilities of the British Thomson-Houston Company (SA) (Pty.), Limited, and Metropolitan-Vickers South Africa (Pty.), Limited, as from November 1. Mr. L. G. Axe, managing director of British Thomson-Houston, and a director of the new parent company, said that the merger and integration resulted from a similar operation in England. Mr. David Stanley, managing director of Metropolitan-Vickers, will be chairman and managing director of the new company.

Company News

E. Chalmers & Company, Limited, non-ferrous scrap-metal merchants and ingot manufacturers, of Edinburgh—A final dividend of 10 per cent. makes 15 (12½) per cent. for the year to August 31, 1959.

H. W. Lindop & Sons, Limited, malleable iron-founders, etc., of Walsall (Staffs)—With a final payment of 20 (16½) per cent., the dividend is held at 23 per cent. Group net profits for the year ended June 30 were £17,445 (£24,844).

Cambridge Instrument Company, Limited—It is proposed to subdivide the £1 ordinary and unclassified £1 shares in order to bring the nominal value more into line with the general practice of companies engaged in engineering. The subdivision is due to come into operation on October 28.

William Doxford & Sons, Limited, engineers and shipbuilders, of Sunderland—The dividend is raised to 30 (25) per cent., the board considering that the holders should receive some benefit from results of favourable years, leaving future distributions to be determined in the light of prevailing circumstances. Group profits, after tax, were £667,005 (£551,808).

Lake & Elliot, Limited, iron and steel founders, of Braintree (Essex)—With a final payment of 10 per cent. the ordinary dividend for the year ended July 31 is 12½ per cent. For 1957-58 an interim of 5 per cent. was followed by a one-for-two scrip issue, and a final of 7½ per cent. was paid on the present capital. Group net profits were £174,977 (£154,146).

William Sugg & Company, Limited, engineers and non-ferrous founders, of London, S.W.1—A final dividend of 7½ per cent. makes 12½ per cent. for the year ended June 30, 1959, and in addition there is a capital distribution of 2½ (nil) per cent. gross. The total for 1957-58 was 10 per cent., paid as a special interim. Group net profit is £29,328 (net loss of £13,619) after tax of £4,576 (£1,197).

Acrow (Engineers), Limited—Turnover for the first six months of the current year exceeded last year, said Mr. W. A. de Vigier, chairman, at last week's meeting in London. Given a continuance of present trading conditions, he said, the current financial year should prove once more to be a record one. "We should, therefore, be able to maintain at least the present dividend on the increased capital," he added.

Pollard Ball & Roller Bearing Company, Limited (formerly Ferrybridge Industries, Limited)—The 1959 interim is effectively raised by 1 per cent. to 5 per cent. on the capital as increased by a one-for-four scrip issue. Estimated net profit, before tax, for the six months ended June 30, is £238,000, compared with £165,000 for the same period of 1938. The 1958 total dividend was equivalent to 18 per cent. on the present capital.

Hartley & Sugden, Limited, boilermakers, etc., of Halifax—The offer by F. Francis & Sons (Holdings), Limited, manufacturers of metal containers, etc., of London, S.E.13, for the company's capital has been accepted by holders representing 93.73 per cent. of the preference and 97.55 per cent. of the ordinary and has become unconditional. The remaining shares are to be acquired compulsorily, unless acceptances are received in the meantime.

Ford Motor Company, Limited—The company is raising its interim from 8.4d. to 1s. per £1 unit for 1959, or from 3½ per cent. to 5 per cent. Including a special interim for the current year, the effective 1958 total was 2s. 4.8d., or 12 per cent. Earnings in the first half of this year exceeded those for the corresponding 1958 period, and group n
£9,311,270 compares with £6,894,407. T
the second half of 1958 was £6,426,151

Manganese Bronze & Brass Compa
The company has acquired for £303,35
issued share capital of Redro, Limited,
of tubular-steel furniture, of Hull, c
redeemable preference shares, of which
outstanding as at March 31, 1959, and w
been redeemed by that company. Redrc
before tax, for the year ended March
£76,698. Net group assets on that date

Qualcast, Limited, light repetition
founders and lawn-mower manufacturer
Order-books are satisfactory and all plan
to capacity, states the chairman, Mr. J.
Output and profits for the year to June
records, the group net profit being £632,
The 15 per cent. final dividend on inc
makes a total equivalent to 26¼ per cent.
on the old capital and 3 per cent. (nil)
distribution.

J. & J. Dyson, Limited, makers c
firebricks, ganister, etc., of Sheffield—
placing of shares a year ago a divide
cent. on the £250,000 ordinary capital
for the year to March 31, 1959. Group
is £202,500 (£220,284) and the net prc
(£111,008), after depreciation of £35,839
tax of £68,534 (£82,549). The chair
Lomas, reports that output is now ru
near pre-recession level.

Morgan Crucible Company, Limit
posed that the capital of the company t
£10,000,000. This will be achieved by th
of £1,762,268 from reserves and th
2,720,000 new "A" ordinary shares of £
new "B" ordinary shares of £1. Thes
verted into "A" and "B" ordinary sto
paid. Existing "A" and "B" ordinar
will then receive two units of stock fo
the same class held on October 1.

A. A. Jones & Shipman, Limited, ma
machine and small tools, of Leiceste
the first six months of the current yea
to the average profits for the whole of
1958 orders were steadily falling, wi
1958, as the low point. Since that mc
been an increase of order intake con
by month to the present time. The incr
is being reflected in increased turnc
directors expect that there will be a
figure for 1959 than for 1958. Steps ha
to terminate the losses of the Canadian
sales procedure in the North American
been drastically reorganized. The interi
5 (same) per cent.

Winget, Limited, manufacturers
machinery and contractors' plant, of Roc
The chairman, Mr. R. Ducas, believes
pany's prospects for the coming year are
a year ago. He reports that the overall
of orders in the latter part of last year
and sales for the first quarter of 1959-
more than 15 per cent. Referring tc
expansion, Mr. Ducas states that pla
consideration requiring an expendit
£100,000. Of this sum, about half will
the current year. It is expected that thi
together with the additional working ca
for the development of subsidiaries, ca
from the company's own resources.

Nodular-cast-iron Piston-rings with a Ferritic Matrix

By Traian Dumitrescu and Pascal Popescu*

In contradiction of the normally accepted dictum that piston-ring material should be mainly pearlitic in matrix structure, this article, from a Roumanian source, puts forward a reasoned case for the use of a ferritic matrix, provided the graphite is in the nodular form and the silicon content of the iron is kept relatively high.

Since the purpose of piston rings is to ensure gas-tightness between piston and cylinder, under quite exacting working conditions, the material used for the manufacture of these rings must possess the following physical and mechanical properties: high elasticity, good resistance to wear and corrosion, high mechanical strength, particularly as regards resistance to bending stresses, as well as strength at high temperatures. Due to its structural characteristics and especially to the presence of graphite, grey cast-iron, as compared with other metallic materials, realizes these properties to the greatest extent, which explains its wide use in the manufacture of piston rings.

Background Information

Past experience has shown that, whatever the chemical composition of the cast-iron may be, the best structure for piston rings is a pearlitic/sorbitic one, with phosphide eutectic in a fine network, and with medium-size lamellar graphite, uniformly distributed. Ferrite is an undesirable constituent and, according to standards adopted in Roumania and elsewhere, the limit of it is 10 per cent. in the case of piston rings of good quality[1-6]. To obtain such a structure there are, however, numerous technological difficulties, especially when one is dealing with single-ring and centrifugal pot castings made in metal moulds, on account of the great tendency towards the formation of cementite and undercooled graphite[1-3].

The continuous development of internal combustion engines in recent times—necessitating materials with better physical and mechanical properties, and the finding of new techniques for improving the quality of the materials (especially in the case of piston-ring materials)—has become the constant care of metallurgical engineers. A solution offering improvement of the quality of piston rings used in powerful engines was found in alloying cast-iron with Cr, Ni, Mo, V and W, in various proportions and combinations, according to the loading of the engine[5-7]. The alloying of cast-iron with these elements led to a considerable rise in the quality characteristics of the piston rings. However, in using alloys, the technological difficulties connected with the obtaining of the most adequate structure became even greater instead of less, due to the marked tendency for cementite and undercooled graphite to appear in the structure of the metal.

Early Attempts with Nodular Iron

Recently attempts have been made to manufacture piston rings from pearlitic nodular cast-iron, because that special material has great elasticity and a good resistance to wear, mainly on account of the shape in which the graphite appears. Research work carried out so far has shown that, apart from their usual characteristics, piston rings made of nodular cast-iron have the disadvantage that the stability of their properties is rather reduced at the temperatures prevailing in the cylinder, and that the only possible way of improving the quality of these piston rings is the alloying of the cast-iron with Cr, Mo, V, or W[8].

It should be pointed out that the presence of magnesium in such cast-iron favours considerably the formation of cementite and, under the casting-conditions of piston-rings, increases the difficulty of obtaining a pearlitic structure. It is therefore obvious that these difficulties will increase when the action of magnesium is accompanied by a similar action of chromium, molybdenum, vanadium and tungsten.

Likewise, bearing in mind the great variety of pearlite/cementite structures obtained in the casting process and the marked tendency of ferrite to precipitate in annealed nodular-graphite cast-iron, it is rather difficult to see how such structures, in the case of piston-rings, can be corrected by heat-treatment under industrial conditions.

Modified Viewpoint

In order to avoid the inconveniences connected with the obtaining of pearlitic structure, but still to use the advantages of the nodular form of graphite, the present Authors, basing their ideas on a previous research[9], envisaged the possibility of utilizing in the manufacture of piston rings a ferritic nodular cast-iron, alloyed with 4 to 5 per cent. silicon. The main characteristics of such a cast-iron are its excellent structural stability at high temperatures, its great resistance to oxidation and corrosion, and its great elasticity.

The fairly high hardness of such cast-irons, lying within the limits required for piston rings, as well as the strain-hardening capacity of alloyed

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* Senior scientific officer, Metallurgical Research Centre, PRR Academy, Bucarest, Roumania.

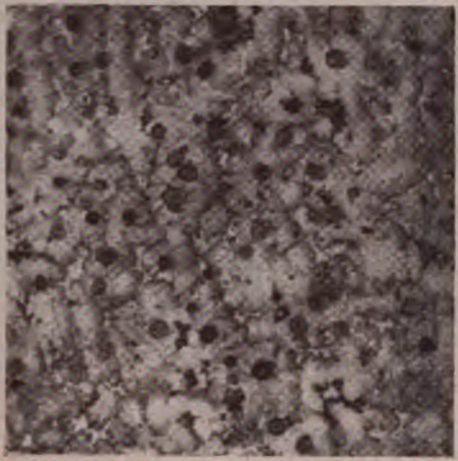

FIG. 1.—*Photomicrograph of the etched structure of iron No. 1 in Table 1 (pearlitic nodular-graphite iron).*

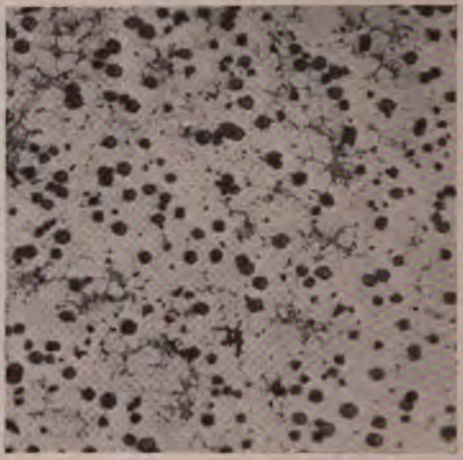

FIG. 2.—*Etched structure of iron No. 3 (see Table 1); this matrix is mainly ferritic in structure.*

ferrite, led the Authors to the assumption that nodular-graphite cast-iron with 4 to 5 per cent. silicon would still have a good resistance to wear. However, this quality of the new material was the main unknown factor to be investigated. On the other hand, the presence of a large proportion of silicon made it certain that the difficulties caused by the separation of cementite, or by its decomposition by heat-treatment, would be completely overcome. These considerations, therefore, were the principal elements which encouraged the Authors to make an attempt to use a ferritic nodular cast-iron in the manufacture of piston rings.

Experimental Conditions

The cast iron was melted and alloyed in an acid electric furnace, under a neutral slag made up from quartz sand, lime and bauxite. As alloy, ferro-silicon containing 75 per cent. Si was used. The molten iron, at 1,400 to 1,450 deg. C., was inoculated with metallic magnesium, in the proportion of 0.7 per cent. The magnesium was introduced with the aid of a plunger having perforations on its lateral sides, in the interior of a specially arranged capsule. For modification 0.5 per cent. of 75-per cent. ferro-silicon was used.

Casting was effected centrifugally, by horizontal machines, using metal moulds lined with a refractory wash, sand and ferro-silicon powder. Pot castings were produced of 137-mm., i.d; 170 to 180-mm., o.d., and 240-mm. long. Immediately after casting, they were placed into a furnace heated to 850 deg. C., maintained at that temperature for three hours and then left to cool in the furnace. The pots in which it was desired to obtain a pearlitic structure were air cooled after casting. As the hardness of these was too great, they were later annealed for one hour at 700 deg. C., followed by cooling by air. The hardness of the bushes varied between 240 and 270 Brinell. After the usual turning and fininshing operations, the authors obtained compression, scraper and oil-retaining rings with a diameter of 160 mm., for a 2,000-h.p. type M42 aero-engine.

Chemical Composition

As is shown by Table 1, the silicon contents of the cast-irons vary mainly between 3.80 and 5.22 per cent., the small variations in manganese and phosphorus contents being due to the fact that there were two different charges. The diminution of the carbon content is due to the decrease of carbon solubility as silicon content increases.

TABLE 1.—*Percentage Compositions of Nodular-graphite Cast-irons used for Tests.*

Sample No.	C.	Si.	Mn.	S.	P.	Mg.	Charge No.
1	3.16	3.80	0.71	trace	0.52	0.069	1
2	3.00	4.00	1.04	,,	0.45	0.075	2
3	2.92	4.27	1.04	,,	0.47	0.084	2
4	2.79	4.42	1.00	,,	0.46	0.088	2
5	2.78	4.56	0.70	,,	0.55	0.120	1
6	2.70	5.22	0.72	,,	0.53	0.110	1

Microstructures

As test-pieces for the study of microstructure, rings cut from the top and bottom of the pots, at a distance of 25 mm. from the edge, were used. As shown by Fig. 1, the microstructure of cast-iron No. 1 consisted of graphite nodules, sorbitic pearlitic and phosphide eutectic in a fine network. The microstructures of the cast-irons Nos. 2 to 6 consist of graphite nodules, ferrite in equiaxial crystals of different sizes and phosphide eutectic in a fine network, the structure of iron No. 3 being shown in Fig. 2.

Piston rings made of the nodular cast-iron were studied in parallel with those commonly used in the aero-engine M42. The latter are made out of alloyed cast-iron having the following composition: C, 2.9 to 3.2; Si, 1.4 to 1.9; Mn, 0.7 to 1.2; Cr, 0.3 to 0.6; Ni, 0.8 to 1.6; P, 0.4 to 0.6; W, 0.15 to 0.6; Mo, 0.05 to 0.2 per cent. Their microstructure consists of thin graphite flakes uniformly distributed, fine lamellar pearlite and phosphide eutectic in a fine network. Their hardness varies between 97 and 107 Rockwell, B scale.

Springing of the Rings

ts of the springiness of rings were carried
r annealing the samples at a quite low temper-
followed by oil quenching. The opening of
.p and the conditions of treatment are shown
ble 2, from which it will be observed that
lasticity of piston rings made of ferritic
ır cast-iron is greater than that of pearlitic

:.—*Test Results for Determining Opening Conditions of the Gap*

e of ring.	Gap opening (mm.).		Annealing temperature (deg. C.)	Duration of annealing (min.)	Cooling medium.
	Before treatment.	After treatment.			
: grey cast- ılloyed with , Mo and W . .	29	18 to 19	620	30	oil
· nodular iron	20	17	620	30	,,
nodular iron	13 to 16	13 to 16	680	60	,,

on piston rings alloyed with Cr, Ni, Mo and
ır of pearlitic nodular cast iron. Thus,
ler to obtain the same degree of tension, the
ı ferritic nodular cast-iron piston rings can be
ımaller than gaps of other piston rings, par-
·ly in those made of alloyed cast-iron.

fact that piston rings made of ferritic nod-
ast-iron have a gap with a small opening is
vantage, because they are then subject to a
r bending stress under working conditions,

further examination of the Table 2 it can
n that the piston rings with a pearlitic struc-
ɔarticularly those made of cast iron alloyed
Ɔr, Ni, Mo and W, are left with fairly large
al internal stresses, as is revealed by the
r opening after heat-treatment. Under
ıg conditions, such stresses lead to a decrease
d uneven distribution of, the pressure upon
·linder walls. It is not possible to have the
ıg made at higher temperatures, so as to
these stresses disappear completely, because
ıer temperatures structural modifications take
and at the same time the material loses some
hardness and elasticity. From Table 2, it
·s, however, that such a treatment can be
d satisfactorily to piston rings made of
: nodular cast-iron, because structural modi-
ns and, consequently, a decrease in hardness
ıer physical and mechanical characteristics,
ɔ longer factors.

Hardness and Stability

The hardness of piston rings made of pearlitic nodular cast-iron was 95 Rockwell B, while that of ferritic nodular cast-iron piston rings varied between 93 and 103 Rockwell B, according to the silicon content.

To check stability at high temperatures, piston rings introduced in to a cylinder lining of engine M42 were heated up to 500 deg. C., and maintained for 10 hr. at that temperature. The stability of the physical and mechanical characteristics was ascertained by measuring the tension, and the size of the gaps, before and after treatment. Surveying the data shown in Table 3 it would appear that, as regards the stability of physical and mechanical properties at high temperatures, there is small difference between piston-rings of cast iron alloyed with Cr, Ni, Mo and W, and those of pearlitic nodular cast-iron. On the other hand, piston rings of ferritic nodular cast-iron are superior to those with a pearlitic structure, their physical characteristics being at least three times as stable.

The maintenance of tension and of the opening in piston rings made of ferritic nodular graphite cast-iron, at values close to the original values, is, to a great extent, due to a complete absence of internal stresses. The stability of physical and mechanical characteristics of these piston rings is, however, determined by the rigidity of the crystal lattice of the Fe/Si solid solution, and the absence of structural changes in the temperatures range between 20 and 900 deg. C.*

Resistance to Wear

Wear resistance was determined by testing the piston rings in a 12-cylinder, 2,000-h.p., water-cooled M42 aero-engine. Piston rings of nodular cast-iron were mounted on the pistons on the left-hand side of the cylinder block. Each piston had rings of the same, or a very similar, chemical composition. Cast-iron piston-rings alloyed with Cr, Ni, Mo and W were mounted on the pistons on the right-hand side. The test was completed in three stages, each consisting of running-in, adjustment, idling and endurance cycles. The test lasted 119 hr. 30 min. and the resistance to wear was determined by measuring the thickness, the opening of the gap, and the weight of the piston rings before and after the test. In Table 4 are set out the results obtained, expressed as the decrease of thickness, the widening of the opening due to the wear of the peripheral

3.—*Variations in Tension and in Opening of Gap as a result of a 10-hr. Annealing Test of Rings under Compression (at 500 deg. C.).*

Type of ring.	Diametrical tension of rings.		Loss in tension.		Gap.				Remarks.
							Reduction.		
	Initial load (gm.)	Final load (gm.)	(gm.)	(per cent.)	Initial (mm.)	Final (mm.)	(mm.)	(per cent.)	
grey cast-iron, alloyed r, Ni, Mo and W . .	5,050	2,020	3,030	60	21.50	7.90	13.60	63.00	Average values for five rings
nodular iron	5,800	2,575	3,225	56	17.75	7.00	10.75	61.00	Average values for two rings
ıodular iron	5,050	4,130	920	18	14.66	11.61	3.05	20.80	Average values for nine rings

Piston-rings with a Ferritic Matrix

surface on the cylinder walls, and the loss in weight of the rings. An analysis of the data presented shows that the wear resistance of piston rings made of alloyed cast-iron, and of those made of pearlitic nodular cast-iron, is lower than that of the ferritic nodular cast-iron piston-rings.

TABLE 4.—*Results of Piston-ring Tests on a 2,000-h.p. Aero-engine, duration* 119 *hr.* 30 *min.*

Type of piston ring.	Purpose and position of the rings.	Wear thickness		Opening of the gap		Loss of weight		Variation in tension		Number of tests on which results are based.
		(mm.)	(per cent.)	(mm.)	(per cent.)	(gm.)	(per cent.)	(gm.)	(per cent.)	
Pearlitic cast-iron alloyed with Cr, Ni, Mo and W	Compression									
	Upper	0.034	1.470	0.116	23.20	0.57	1.275	−775	−14.15	Six
	Lower	0.020	0.870	0.067	12.50	0.17	0.375	−300	− 5.40	Six
	Scraper	0.020	0.872	0.144	34.10	0.12	0.271	−122	− 2.29	Eighteen
	Oil-retainer	0.019	0.356	0.230	4.10	0.07	0.163	−125	− 2.68	Twelve
Pearlitic nodular cast-iron	Compression									
	Upper	0.020	0.862	0.200	40.00	0.66	1.540	−1,400	−24.10	One
	Lower	0.010	0.435	0.000	0.00	0.07	0.160	−400	− 7.40	One
	Scraper	0.010	0.435	0.050	11.10	0.06	0.140	−25	− 0.44	Two
Ferritic nodular cast-iron	Compression									
	Upper	0.018	0.784	0.040	7.00	0.31	0.726	−270	− 5.6	Five
	Lower	0.009	0.391	0.060	11.30	0.15	0.360	−200*	− 4.31	Five
	Scraper	0.007	0.306	0.075	14.56	0.15	0.349	−112 +350	− 2.22 + 7.86*	Ten
	Oil-retainer	0.024	0.450	0.300	5.33	0.14	0.342	−31 +50	− 0.56 + 1.12*	Ten

* Value for one ring.

Variation of Tension

The data in Table 4, referring to the variations of the diametrical tension in the course of the test in the motor, demonstrate once more the much superior qualities of piston rings made of ferritic nodular cast-iron. The increased tension observed in some piston rings made of ferritic nodular cast-iron is, in the Authors' opinion, due to the strain-hardening of the material on the friction surfaces of the piston ring. This strain-hardening phenomenon is widely supposed to be responsible for the increased resistance to wear of the Fe/Si solid solution.

Cylinder Wear

In the same series of tests, cylinder wear was determined by measuring the cylinder diameters at the upper " dead " point (in the direction of movement, and in a direction perpendicular to it) at the beginning and end of the test. The least wear, equal to 0.02 to 0.05 mm., occurred in the case of piston rings of ferritic nodular cast-iron. A greater wear (0.08 mm.) was produced by piston rings of pearlitic nodular cast-iron, while the greatest wear (0.04 to 0.12 mm.) was caused by piston rings made of alloyed cast-iron.

Conclusions

The experiments with piston rings of nodular cast-iron, and the analysis of their characteristics compared with those of cast-iron piston rings alloyed with Cr, Ni, Mo and W, as well as experience gained in the manufacture of alloyed cast-iron piston rings, have allowed the Authors to reach the following conclusions:

(1) Piston rings made of ferritic nodular cast-iron have greater elasticity than those made from alloyed flake-graphite iron, or even of those made from pearlitic nodular iron.

(2) The hardness of piston rings made of ferritic nodular cast-iron represents the lower limit in the scale of hardness admissible for that kind of iron, and consequently cannot decrease following an annealing treatment, even at high temperatures.

(3) Piston rings made of ferritic nodular cast-iron have no internal stresses whatever, in contrast to piston rings of pearlitic, alloyed, or of nodular-graphite iron.

(4) Piston rings made of ferritic nodular cast-iron maintain their physical and mechanical properties at high temperatures to a much greater extent than piston rings made of pearlitic cast-iron, alloyed, or made from nodular-graphite iron.

(5) The resistance to wear of ferritic nodular cast-iron piston rings (as manifested by the reduction of thickness, the widening of the gaps, and loss in weight during the 119-hr. test with a 2,000-h.p. aero-engine) is superior to that of rings made from the other materials.

(6) Piston rings of ferritic nodular-graphite cast-iron produce less wear in cylinder liners.

(7) The production technology of piston rings made of ferritic nodular cast-iron is simpler, because not only does the charge require only a single addition element for the alloy (with a comparatively low melting point and great solubility in iron), but also the presence of 4 to 5 per cent. silicon prevents the formation of cementite, even in individual casting of piston rings.

(8) Using as an alloy only the cheap and easily procurable silicon, and casting without rejects (because unsuitable structures can be avoided), and being able also to cast individual rings, means that the cost of piston rings of ferritic nodular cast-iron can be kept below that of pearlitic cast-iron piston rings, alloyed, or with nodular-graphite.

The above technical and economic advantages, inherent in piston rings made of ferritic nodular

**ıre, in the Authors' opinion, powerful
in favour of their large-scale adoption.**

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ıetal Preference Consolidation

shareholders particulars of a preference
ɔn scheme, Mr. W. E. Ogden, chairman of
Metal Company, Limited, London, S.E.10,
t output and profit for the first nine months
ceed the corresponding 1958 period.
ference scheme involves the creation of a
ɔf 6 per cent. cumulative preference shares,
ı in the five subsidiaries—Elkington & Com-
ted, J. W. Singer & Sons, Limited, James
Company, Limited, Sanbra, Limited, and
ts, Limited—will, subject to approval, be
exchange their holdings (all 6 per cent.
on a par basis. The James Booth &
7 per cent. preference holders will be
: extra share for every six, as compensation
ction in the dividend rate.
ference capital of the subsidiaries concerned
o £590,000 of which the group holds
Assuming full acceptance the total number
ce shares to be issued will be 577,919. The
al dividend will be unchanged at £34,675.

ıl Closures/John Dale Merger Proposal

ions between the boards of Metal Closures,
nanufacturers of bottle-sealing machines,
st Bromwich (Staffs), and John Dale, Limited,
rers of non-ferrous collapsible tubes, alu-
d light-alloy castings, etc., of London, N.11,
ɔgress with a view to a merger of their
iterests. There have been close trading asso-
:tween the two companies for many years.
:ted that the merger proposals will be sent
lders next week.
' of 19s. for the ordinary shares of the West
company has been made on behalf of a
', Winterbottom Industries, but shareholders
:d to take no action on this until they
tails of the merger terms and the directors'
dations.

.Y AT THE LETCHWORTH WORKS of K & L
ers & Engineers, Limited, a member of the
ɔhen 600 Group, Limited, the 1,000th Jones
ane to be built there by the company was
er to the National Coal Board by Mr. Frank
naging director of the company.

Industrial Psychology Grant increased

Annual grant to the National Institute of Industrial Psychology is to be continued by the Department of Scientific and Industrial Research for a further five years.

The amount is to be raised from £4,000 to £6,000 a year on the understanding that the Institute will increase to £9,000 a year its own income from membership subscriptions and special contributions for long-term research. Up to now, the DSIR has provided £4,000 if the Institute raised a like sum from these sources. The DSIR is also to add another £100 a year for every £100 of grant-earning income which the Institute can obtain in excess of the qualifying £9,000, up to a maximum of another £6,000 a year. Previously the maximum was £4,000 for income in excess of £4,000. This means that if the Institute can raise £15,000 a year from industry the Government will give it £12,000. The grant and the grant-earning income have to be put in a special fund and used only for long-term research. The DSIR grants began for a three-year trial period in October, 1956. Last year, the Institute received the maximum (under the old arrangements) of £8,000. Most of the grant-earning income comes from industrial firms, who contribute as corporate members of the institute.

Among research projects now in train are an inquiry into workers' attitudes to the opportunities and rewards offered by their jobs which may have a bearing on personnel policies; an investigation into the relation between satisfaction and efficiency on the job; a study of industrial management structure and efficiency and experiments on tests for manual skills. The Institute has received many inquiries from industry recently about the special tests it has devised for selecting suitable school-leavers to be engineering apprentices.

The Institute is embarking on its usual series of autumn and winter courses for personnel officers and others in such subjects as interviewing, intelligence testing, and vocational guidance. A new departure this year is an introductory course on assessing and selecting people for jobs to serve as background for those who later attend one of the more detailed courses.

C & G Foundrywork Awards

The following prizes offered on behalf of the Institute of British Foundrymen were awarded to successful candidates in the City and Guilds examinations in patternmaking and foundry practice held in 1959:

Buchanan Silver Medal: Foundry practice—advanced: James L. May, of Bristol.

Buchanan Prizes: Patternmaking—final: Robert Frost, of Altrincham, and David J. S. Skinner, of Dundee. Foundry practice—final: Alan M. Croft, of Leyland (Lancs), and David Adam, of Bannockburn.

The *P. H. Wilson Prizes*—established by the late Mr. P. H. Wilson, O.B.E., a past-president of the Institute—for successes in the ordinary examinations, were awarded as follow: *Patternmaking:* First prize to John Y. Strathern, Clyde Bank, Glasgow, and second to Colin R. Sullings, Ipswich. *Foundry Practice:* First prize, John Fraser, Carluke, Lanarkshire, and second prize, Hugh P. Williams, Sheffield.

MR. E. H. ROGERSON, who was for 33 years manager in Scotland for Cochran & Company, Annan, Limited, boilermakers and engineers, of Annan (Dumfriesshire), was given a dinner in Glasgow recently, by representatives of the engineering industry on the occasion of his retirement.

Obligation to fence Dangerous Machinery

By " Barrister-at-

The nature and extent of the statutory obligation imposed on en by the Factories Act to fence dangerous machinery was the su a judgment in a recent case, the findings of which coul equally well to circumstances which might arise in foundr

Section 14 of the Factories Act, 1937, requires every dangerous part of any machinery to be securely fenced. It is provided by s. 133 of the Act that, if any person suffers bodily injury in consequence of the occupier of a factory having contravened any provision of the Act, the occupier is to be liable to a fine not exceeding £100. According to a proviso to s. 133 however (proviso (aI), in the case of injury to health, the occupier is not to be liable to a fine, unless the injury was caused *directly by contravention* of the Act. Among the points raised in Dunn *vs* Birds Eye Foods, Limited, were the questions: whether the Act imposed an absolute obligation on the occupier to fence, and whether any responsibility would rest on the occupier where the accident was due to the employee's own fault. The Court was further called upon to consider the meaning of the words " injury to health " in the above proviso.

Material Facts

The material facts of this case were briefly as follow:—

The employee in question was engaged as a general labourer in the sanitation shift, and was engaged in cleaning a belt conveyor (which ran over a drum) alongside a row of snipping machines when the accident happened. The drum and belt, which could have been securely fenced by a fixed guard, were unfenced at the time in question. While there was no danger to the operator when operating the machine, there was some risk if it was left in motion while it was being cleaned. Contrary to instructions, the employee was cleaning the machinery with his hands without having switched it off, and he had neglected to do so apparently to save himself the trouble of walking to the switch. His hand was caught in the machinery while it was thus in motion, and was badly lacerated. The accident was therefore his own fault.

" In Consequence "

Was the injury " in consequence " of the failure to fence ?

In these circumstances, could it be said that the injury had been occasioned " in consequence of " the occupier's failure to fence the machinery, so as to render the occupier liable?

At first sight it would appear that the accident could not have been said to have occurred *in consequence of* the failure to fence—since the accident was the employee's own fault. Even if there had been a guard, the employee would have removed the guard and proceeded to clean the ma while it was still in motion. However, th declined to accept this view. The Act, i opinion, placed an absolute obligation on th pier to fence. Had there been a fence the a in the opinion of the Court, would not ha pened. Accordingly, it could be said t accident was in consequence of the occupie travention of the Act in failing to fence.

" Caused Directly "

Was the injury " caused directly " by the vention?

It was then argued that, even assuming accident was " in consequence of " the fa fence, it was not " caused directly " by such so that the occupiers were not liable to a The Court conceded that, even if the fa fence was a " cause " of any " injury to the occupier would not be liable unless it w " direct cause " of such " injury to health,' occupier would, in such circumstances, b by the above proviso (a) S.133). But th held that the words *injury to health* in the were meant to cover *diseases* which a v might suffer because of a breach of the A result of dust, for instance, and that the w not apply to an injury caused by an accide as a mutilated hand for instance) as in thi

Accordingly, the occupiers of the facto not entitled to pray in aid the above pro and were held liable for the contraventio Act in failing to fence the machinery.

Italian Subsidiary for Allis-Chalmers

Establishment of Allis-Chalmers Italiana majority-owned subsidiary of Allis-Chalmers turing Company, Milwaukee, USA, and the ac by the Italian company of the facilities of S.p.A., manufacturers of crawler tractors a parts, of Cusano, Milan, is announced. Vend a substantial share in the new company. plant, which produces crawler tractors pow diesel engines ranging from 60 to 325 h.p., b shovels, and other related equipment, will ena Chalmers to give improved service to western countries and Britain. The tractors, etc., marketed through the present Allis-Chalme national dealer organization. Mackay Industri ment, Limited, Feltham (Middx), is the Allis- UK industrial distributor.

Development at Holman Headquarters

Brothers, Limited, following integration with
:k Drill & Engineering, Limited, have under-
ılue of this part of their production by the
ı of a completely up-to-date metallurgical
l heat-treatment department at their head-
Camborne, Cornwall. This centralization
gical research, control and heat-treatment
resulted in greatly increased efficiency and a
speed-up in production. The new depart-
a floor area of 17,000 sq. ft., contains metal-
ysical and chemical laboratories, and high-
-steel, piston and general heat-treatment
e Fig. 1). All kinds of day-to-day problems
, such as the machinability problems that
confront the man on the shop floor, etc.
analysed, and routine metallographic
ıs carried out. The heat-treatment of high-
s, highly-alloyed steels and tool steels is
in Birlec, GEC, and EFCO batch-type fur-
c forced-air circulating tempering furnaces,
el salt-bath furnaces, and Shorterizing equip-
› included in the section are machines for
ting, shot-peening and shotblasting. Heat-
of constructional case-hardening steel is
by operations involving annealing, normal-
arizing, hardening and tempering. Equip-
is section includes Wild-Barfield drip-feed
zers, EFCO salt-bath furnaces, Birlec 110-
rburizing furnaces and various types of oil-
machinery. Spencer Halstead rotary shotblast equipment is used for general shotblasting operations.

art of the new heat-treatment department
dquarters of Holman Brothers, Limited,
rne. In the illustration, rock-drill parts
furnace in the background are being
in oil, following heating in a Birlec
furnace.

dustrial Safety Conference

ıal conference of the Institution of Industrial
cers will be held this year at the Grand
hton from November 6 to 8. It will open
ıer on the Friday evening preceded by the
ıeral meeting of the Institution at which
r the ensuing year will be elected.
rking sessions of the conference will be
he theme "Education and Training Tech-
Safety." During the opening session on
norning, the framework of a safety course
isors will be discussed by representatives
rent types of industry, and the Saturday
sessions will include one in which new
afety films will be shown and discussed. In
, a paper on "Training Equipment and Visual
be presented jointly by Mr. B. A. Inshaw,
ıe Industrial Safety Division of the Royal
the Prevention of Accidents, and Mr. B. L.
division safety officer, plastics division,
hemical Industries Limited. A quantity of
ıing aids will be on display for the benefit
s.
erence will end at lunchtime on the Sunday,
er entitled "Winning Support by the Spoken
resented by Mr. Rex Roberts, Imperial
ndustries, Limited.

Steel Plants in India

Preliminary opinions in official Indian Government circles indicate that the expansion of the three new steel plants may take precedence over the establishment of a fourth plant at Bokaro. The present view is that ingot capacity should be increased from 6,000,000 tons (1961) to 10,000,000 tons of steel by the end of the Third Plan period.

The size of the steel output, its composition and the phasing of expansion of the existing units will, however, depend on the completion of studies setting out the country's requirements in terms of finished products. The pattern of demand will also determine the type of end products for which the Bokaro unit should be designed.

The preparation of a preliminary project report for the proposed Bokaro plant has already been entrusted to a firm of Indian consultants. Hindustan Steel, Limited, has also set up the nucleus of a central design office at Rourkela.

The heavy machine building plant and the heavy forge and foundry shop at Ranchi, and the heavy electrical equipment plant at Bhopal will all start production during the Third Plan period and will be in a position to begin the supply of equipment for part of the contemplated steel expansion programme.

Equipment and Supplies

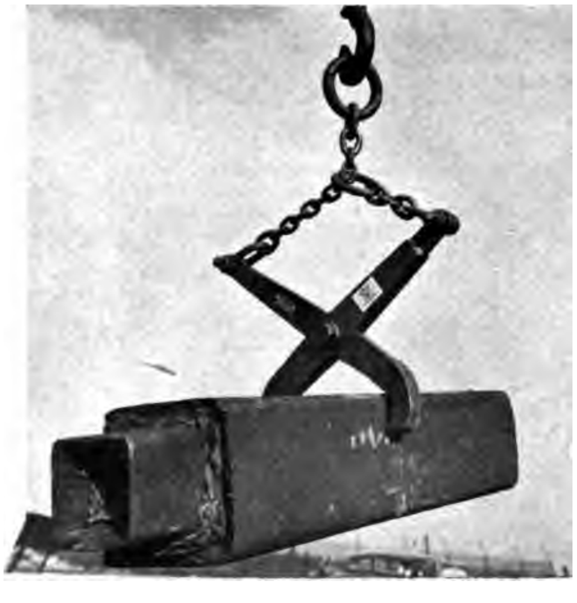
Lifting " Dogs "

Lifting Gear Products (Engineering), Limited, Petre Street, Sheffield, 4, have produced lifting "dogs" (see Fig. 1) of Patent design to take the place of old-fashioned "home-made" dogs, which are often badly designed, roughly made and in many cases dangerous to life and limb. The new dogs (Goliath Universal) incorporate a special chain-compensating arrangement, which enables the dogs to be used when pulling off centre, and which ensures that a tight grip is maintained from any angle. This feature helps considerably when awkward-lying materials have to be shifted, as for example, when billets or bars are roughly stacked in a confined space. The chisel points of the dogs are stellited for long life, and designed with an ample margin of safety, each one being tested to comply with the 1937 Factories Act—a test certificate is supplied. The chain-sling assembly is of hardened and tempered all-steel construction to BSS. 2902, with chain to BSS.1663. Each size of dog can handle a wide range of material. (The dogs are the subject of a Patent application, and all rights are reserved.)

Backings for Welds

A patent* recently published in the name of Midland Silicones, Limited, 68, Knightsbridge, London, S.W.1, describes the use of silicone pressure-sensitive materials in welding. A weld-backing assembly, consisting of glass cloth impregnated and coated with a silicone pressure-sensitive adhesive, to which is attached a flexible steel-tape on one side, firmly adheres to the work places. After welding, the weld backing is easily stripped away and the residual ash brushed off. It is claimed that an excellent smooth weld is produced, and no grinding off of excess material is needed. Other assemblies are described, including one comprising alternate layers of heavy aluminium foil and pressure-sensitive silicone adhesive. It is thought inventions will be particularly applicable whe larly shaped and curved surfaces or pipe-like are to be welded.

FIG. 1.—*Lifting "dogs" designed by Lifting Gear Products (Engineering), Limited, of Sheffield. They are shown here lifting a 1½-ton ingot.*



Cutting-off Machine

Bramcut, Limited, 155, Charles Street, are now manufacturing a cutting-off designed for use in the non-ferrous foundry. The cutter (Fig. 2) is mounted on a strong fabricated pedestal, which carries a drawer to catch the metal dust (this aids in the separation of swarf from different alloys). The machine has a 16-in. cutting wheel, and attachments may be incorporated to catch the finer dust by means of an extraction fan and bag. A 3-h.p. motor belt drives the wheel—the belt being so tensioned that, in case of jamming, it will slip before the wl break. Two speeds are available, the hig aluminium, the lower for bronze alloys and hig brasses.

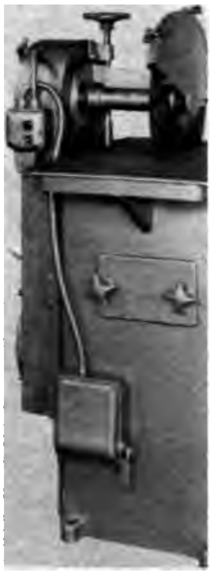


FIG. 2.—*Cutting-off machine for non-ferrous alloys, manufactured by Bramcut, Limited, of Leicester.*

Courses on Temperature Control

West Instrument, Limited, manufacturers of ture-control instruments, are to give courses of tion of one day's duration on the saturable cor type of temperature-control instrument. The fir these were held on October 14 and 15 at the cc London office. The core-reactor forms the bas stepless temperature controller, an instrument to be superior to both the on/off and tim proportioning controllers. It is reported that th trollers are used extensively in furnace o Readers who are interested should write to M Hartnett, West Instrument, Limited, 52, Regen Brighton, 1, Sussex.

Birlec re-style their Box-furnaces

Birlec, Limited, Erdington, Birmingham, styled their standard box-furnaces, to improve ance, rationalize manufacture, and reduce Specially designed to give temperature un across the full hearth width, the new GP furn built for two temperature ranges: (a) up to 1, C.; ranging in capacity from 1.5 to 26 cub. f kw. ratings), and (b) up to 1,400 deg. C., from cub. ft. capacity (16-60 kw. ratings). The balanced furnace doors are hand-wheel operate operation being sold as an optional extra. T ing elements are automatically isolated from th supply when the door is opened, the double open-type transformer being housed in th

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* British Patent No. 817699.

casing. A separate control
is incorporated for each
, and a gas-inlet connection
ded at the rear of the heat-
mber for admitting protec-
hosphere when required. In
P.1,000 range, the three
sizes have resistance ele-
supported in the side walls
cially formed refractories—
wo larger sizes the elements
pported from the roof by
chromium alloy hooks
d in the refractory. All the
s incorporate a heating ele-
on the inner face of the
ontinuously energized from
ate tap transformer to pro-
mpensation for door losses,
ave cast nickel-chromium
earth-plates with side flanges
n the work. For exception-
avy work, such as the heat-
nt of castings, the two
sizes can be supplied with
h of hard refractory brick.
es of the G.P.1,400 range are heated by silicon-
rods mounted transversely above and below
rth, the flanged sided hearth plates being also
f silicon carbide.

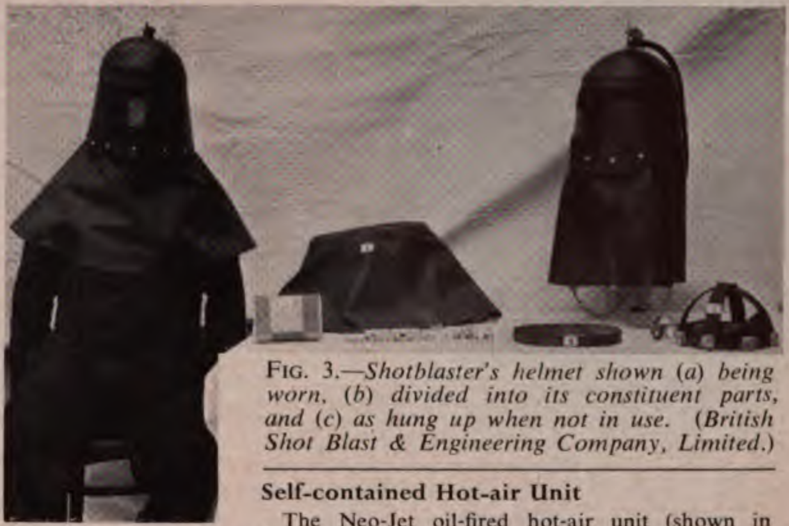


FIG. 3.—*Shotblaster's helmet shown (a) being worn, (b) divided into its constituent parts, and (c) as hung up when not in use. (British Shot Blast & Engineering Company, Limited.)*

laster's Helmet

h Shot Blast & Engineering Company, Limited,
hester Road, Stretford (Lancs), have designed
w type of moulded-rubber shotblast helmet
in Fig. 3. Cleanliness, durability and strength,
l parts replaceable, are features claimed. The
is moulded in ¼ in. thick material and has a
ble rubber outer apron, with a calico inner
to tie up round the operator's neckline. The
can be exchanged when required, by undoing
ws, and replaced by a new cover which can be
stock, thus eliminating the necessity of having
the helmet away for repairs, or keeping some
elmets in stock for replacement. The air con-
has been designed with an "eye" on top, so
e helmet can be hung up instead of being left
on the floor of the shotblast room.

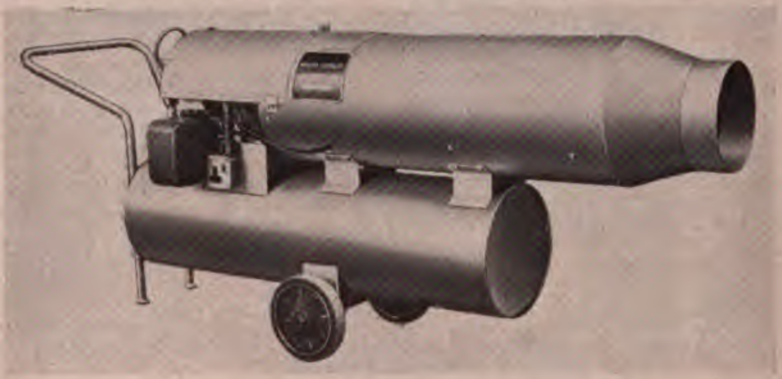
helmet can be trodden on without damage except
yeshield which is replaceable. The head bandeau
he helmet is attached by the air connection, and
taken out by undoing the locking nut, and the
cleaned with a good antiseptic. A rubber band
the top of the eyeshield forms a double guard
shot getting behind the
d and into the operator's
Chains and hooks are at-
to the apron and fit under
pits of the operator, keep-
helmet steady on the head
hen the user is bending
The equipment carries the
Inspector of Factories' cer-
of approval No. 10 and
evant Patent application is
577/58.

Self-contained Hot-air Unit

The Neo-Jet oil-fired hot-air unit (shown in Fig. 4, has been designed by Modern Furnaces & Stoves, Limited, Booth Street, Handsworth Birmingham 21, to provide a portable unit to supplement their range of portable mould dryers (Newstad). The unit is streamlined, light but robust in construction, and is able to deliver 800 cub. ft. of hot air per min. at temperatures up to 300 deg. C. It is fully automatic and operates from a 15-amp. switch. When switched on, the spark ignition operates, the fan starts and hot air is emitted within two or three seconds. The unit burns ¼ to 1 gall. of oil per hr., its cylindrical steel tank holding 15 gall.—with a full tank the unit weighs 250 lb.

Hoist Control: Geo. W. King, Limited, Stevenage, Herts, announce the Snip Snap, a new mains pushbutton control for hoists, which can be applied to all types of hoists, cranes and similar appliances which are wired for mains supply. The Snip Snap control dispenses with the conventional type of reversing contactor, and combines the function of contactor and pushbutton in one compact unit. The patented action avoids the possibility of single phasing. It is not suitable where low-voltage control is required, or can it be employed for remote control arrangements other than by simple extension of the feed cable.

Blade Pack: Simmonds Aerocessories, Limited, St. James, London, S.W.1, have introduced a new triple pack, containing one each of their standard, fine-cut, and half-round 10-in. interchangeable Surform blades.



.—*Hot-air unit designed*
dern Furnaces & Stoves,
l, of Birmingham.

American Letter

Mottling in White-iron Castings[*]

The problem of producing white-iron castings without mottling or primary graphitization, and with adequate annealability, in the larger-section sizes has been considered. The iron must have sufficient graphitizing tendency in the solid state to be malleabilized by a commercially feasible heat-treatment. The test-casting used was a block 4 by 4 by 8 in. long made in a greensand mould, fed by a 9 by 4½-in. dia. riser. Complete solidification took place 30 to 35 min. after pouring. Mottling data were obtained from fractures at the centre of the block. The fracture was called "white" only if it showed no evidence whatsoever of mottling. The effects of different carbon and silicon percentages on the fracture are shown graphically in Fig. 1—the base curve following the carbon and silicon limits for producing "white" fractures is marked. Silicon contents of greater than 2.50 per cent. produced an interesting result—above this limit the base curves for white and grey fractures appear to be coincident. This means that a small increase in carbon content will change the fracture from white to completely grey.

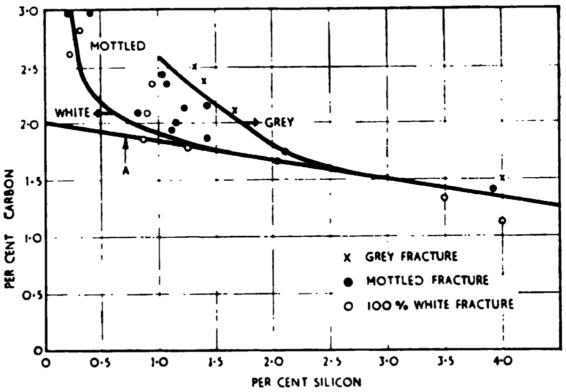


FIG. 1.—*Graph showing the effect of various carbon and silicon contents on the fracture obtained in a 4 by 4 by 8-in. casting. The maximum carbon and silicon percentages which yield a fully-"white" fracture, and the minimum carbon and silicon percentages which yield a completely grey fracture, are indicated by curves. (A = line of maximum solubility of carbon in an iron varying with silicon content, to the formula: per cent. C + ½ per cent. Si = 2.0.)*

Bismuth Additions

Bismuth additions to produce white fractures in heavy-section malleable castings have been used in the past, with the higher silicon and carbon contents. This practice is necessary to obtain sufficient graphitizing tendency on annealing. Bismuth additions in percentages over 0.01 per cent. proved, however, to be of no value in reducing mottling in the 4 by 4 by 8-in. test casting. Furthermore, too low a temperature (1.427 deg. C.) reduced the effectiveness of the additions. Water vapour was then found to be as effective as bismuth in raising the carbon and silicon limits
for mottling. Future studies are to be ai
discovering ladle additions and melting practi
will raise the carbon and silicon limits for
above the base-line curves presented in this r

Lead-cemented Alloys

The feasibility of making a promising new
metallic materials has been demonstrated in
at Battelle Memorial Institute, Columbus, Ohi
new materials, prepared in research sponsored
Lead Industries Association, are "lead-cem
alloys made by mixing molten lead with finely
solid particles of other metals or materials. Th
is a material combining the properties of bo
and the second substance, usually a metal. Su
bined-property materials may be useful in a
of applications. For example, lead is effective
ping gamma rays when used in nuclear-r
shielding. With boron added, the resultin
cemented alloy would be an even more effectiv
ing material, since boron stops neutrons, which
a product of radiation. The corrosion resist
lead, plus the increased strength gained by
other metals, suggests that some of these alloy
be useful to the chemical industry, and othe
tries requiring corrosion-resistant materials.
softness, sometimes a disadvantage, can be an as
since the lead may serve as a binder for di
in mixtures containing less ductile materia
tungsten, or materials with properties of special
such as very fine iron powder with its unusu
netic properties.

Outlook for Copper and Aluminium Castin

Since the end of World War II, the trend in
and copper-alloy casting deliveries has been
continually downward, the one exception b
increased consumption of copper-alloy wrou
cast plumbing fittings. Indeed, the brass and
foundry industry in general is in severe decli
reason for this is the replacement of bron
ings by ball and roller bearings. Another
railway truck journals which were 100-p
babbitt-lined bronze 15 years ago are now eith
or steel-backed babbitt. Another newcomer
bearing field is nylon, and aluminium is als
examination. However, bronze is still superi
other bearings in applications above 5,00
Stainless-steel valves and other cast fittin
replaced brass and bronze in food process
canning, as well as in bleaching and dyeing eq
and stainless is also making great progress
hospital equipment industry. Plastics have
brass castings for ornamental hardware for f
and in other household uses. Furthermore, al
art castings have also made great inroads
ornament business, which at one time belong
sively to the bronze casting industry.

Aluminium

Apart from art-casting side, aluminium h
considerable progress in other fields. Prod
aluminium have an excellent and extensive
programme in hand, for developing new uses f
nium, and better alloys. The industry has bee
with stable prices, and has used this fact a
its most important selling points—sales are con
rising. The brass and bronze foundry indus
take a leaf from the aluminium book, a
through research, new applications for its
Quality must be improved, and prices stabili

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[*] First progress report on an investigation conducted by C. R. Loper, Jr., and R. W. Heine (department of mining and metallurgy, University of Wisconsin, Madison). The *work is being sponsored* by the American Foundrymen's *Society, malleable division.*

[†] Extracts from a paper, by A. R. Barbour (vice-presi
Roessing Bronze Company, Etna, Pa.), presented at the
Foundry Conference on June 25.

POA Annual Conference

Purchasing Officers Association held its annual ıce and "Minibition" at Folkestone this year, eptember 24 to 26. The Minibition judges Mr. D. M. Forrest (chairman of the Design ustries Association); Miss R. S. Absalom (buyer ıt Alloys, Limited); and Mr. P. Fellows (head exhibitions department, Council of Industrial

winning stand in the educational class was that Castings (Altrincham), Limited, of Cheshire ıstration below).

Commodity Price-stabilization

at they can be regarded as considered opinions responsible for the buying policy of influential industry, the following views arising in discusuring the conference are important:

F. S. Lloyd (chief buyer, Crompton Parkinson,), asked whether the aim of price stability itself sound, and if so whether or not the aim e achieved. He himself felt that both the aims jectives were sound, and that stability could in achieved. He instanced commodities in which stability had already been achieved, but said re were, however, difficulties in fixing the actual n relation to costs of production, changes in ue of the currency concerned, and fluctuating rates.

Hon. John Grimston, M.P. ing director, Enfield Rolills, Limited), speaking of ımodities of which he knew ıid that he was on balance -stabilizer. He said he had a personal dislike of Government intervention in business, and Government intervention was essential in any commodity price-stabilization scheme. He felt that the free market would give a greater degree of stability.

Mr. F. S. Anderson, C.B. (chairman of the International Wheat Council), spoke of the methods that had been used to achieve price stability. He outlined the effects of unstable prices in a large number of primary-producing and under-developed countries, and said that it had become generally recognized that there was a valid case for international commodity policy, although any such agreement on a truly international scale would be most difficult to achieve. However, agreements covering tin, sugar and wheat had been concluded, and Mr. Anderson outlined the provisions of these agreements.

Mr. B. S. Yamey, B.COM. (Reader in Economics, London School of Economics), felt that economic history in the last 50 years showed that fairly violent upward movements in price had been the major cause of expansions of productive capacity in the world. He also felt that the critics of price fluctuations should direct their criticism not against the fluctuations as such, but against the causes of these movements. Most swings in prices had been due to changes in the general level of economic activity, and such changes would be likely to play havoc with even the best conceived price-stabilization schemes. He concluded that less risky alternatives, not involving direct intervention, were likely to be available to achieve the given ends.

ward for the best educadisplay at the 1959 tion of the Purchasing s Association went to Castings (Altrincham), d, specialists in the pro-ı of precision investment s. Their stand is shown accompanying illustra-The method of manufacthese castings was shown learly in the display in a r of progressive sections nented by the die used, ıx patterns, the castings ıe actual product incorıg them.

›hn Williams of Cardiff, Limited

:w name—John Williams of Cardiff, Limited—new trade symbol are announced for the longhed firm of ironfounders, metal-window manurs and steel stockholders previously known as Villiams & Sons (Cardiff), Limited. The name has been made for brevity and convenience s the great- and great-great-grandsons of John ıs will still carry on the "and Sons" element old family title. Activities of this company mass production of spheroidal-graphite and ıigh-duty iron castings.

Courses in Metallurgy

Two post-graduate courses have been arranged at the Metallurgy Department of the College of Advanced Technology, Birmingham. One is entitled "Recent Advances in Metallographical Techniques" and the other "Directionality in Metallic and Non-metallic Materials." Both courses are in the form of nine weekly evening lectures each by an authority in his particular field. The first-mentioned course commences on Thursday, October 22 and continues thereafter on successive Tuesdays, while the second will be held on Wednesday evenings from October 21 onwards.

German Foundrymen's Technical Association

October 28 *to* 30 *Jubilee Meeting Programme*

The German Foundrymen's Technical Association (*Verein Deutscher Giessereifachleute*) has issued invitations to its 50th annual meeting to be held at Düsseldorf from October 28 to 30. To mark the special occasion a number of interesting papers will be read at the Robert Schumann Hall—well known as the lecture venue of the 23rd International Foundry Congress held at Düsseldorf in 1956.

The first day of the meeting (Wednesday) has been reserved for works visits, and the morning of the second day starts with a meeting of the VDG's General Council, followed by sessions of the Council with the chairmen of the various technical sub-committees. In the afternoon, the 50th annual meeting will be opened officially with an address given by the VDG's national president, Dr. G. Schwietzke, after which the technical sessions begin. The following is the programme of papers to be read:

(1) The Stress Cube—Structure, Mode of Operation and Results of the Investigation carried out for Cast Iron, by Dr. J. Czikel (chairman: Dr. A. Wittmoser).

(2) Gas in Solution and Combined in Iron/Carbon Casting Alloys, by Dr. A. Königer (chairman: Dr. Siepmann).

(3) Impact Behaviour of Malleable Cast Iron, by Dr. K. Löhberg (chairman: Dr. K. Roesch).

(4) Quantitative Effect of Calcium Carbide on Melting with a Cold-blast Cupola, by Dr. Neumann (chairman: Dr. G. A. Jungbluth).

The sessions of the third day (Friday) will be held in the morning only and in two halls simultaneously:

Group A. Robert Schumann Hall. (9 a.m.-12.30 p.m.)

(5) Application of the Beuken-pattern for the Solution of Heat-transfer Problems in Foundry Practice, by Dr. K. H. Brockmeier (chairman: Dr. K. Orths).

(6) Efficiency of Feeder-heads, by W. Koppe (chairman: Dr. H. Stein).

(7) Grain Shape and Size of Clay-bonded Moulding Sands and their Influence on the Formation of Scabs, by D. Boenisch (chairman: Dr. W. Patterson).

Group B. Small Congress Hall. (9 a.m.-12 noon). After an opening address by P. Schiegries, Hilden, the following papers will be read:

(8) Copper/Hydrogen Equilibrium in Copper and Copper-base Alloys, by Dr. W. Höfmann (chairman: Dr. E. Tuschy).

(9) Production of Pressure-tight Castings in Copper and Copper-base Alloys, by E. Brunhuber (chairman: W. Weisner).

(10) Pressure-tight Castings in the Lightest Useable Alloy, by G. Lieby (chairman: P. Spitaler).

On Friday, October 30, members only will assemble at 3 p.m. in the Robert Schumann Hall under the VDG's president, Dr. Schwietzke. At 4 p.m. guests will be admitted and the assembly will be welcomed by the president, and the festive occasion will be supplemented by orchestral music played by the Bach Society, Düsseldorf, conducted by Dr. Neyses. Then follows the Jubilee lecture by Professor Dr. F. Baade, director of the Institute for World Economics at the Kiel University, entitled "Iron and Steel in the World

(*Continued at foot of col.* 2)

of Tomorrow."

After closing the jubilee meeting, the president will invite members and guests to attend a social evening in the Rheinhalle at 8.30 p.m. with a variety show and musical events, followed by dancing.

ECSC Coal Crisis

A warning against the dangers of individual member states taking unilateral action to deal with the continuing coal crisis was given recently by the new president of the High Authority of the European Coal and Steel Community, Mr. Malvestiti. Such action, he said, could seriously compromise the achievement of a co-ordinated energy policy. Such a policy was necessary in view of the urgent need which faced the coal industry to adapt itself to a new situation.

The ECSC must take the lead, but two conditions had to be fulfilled; there was a need for a complete and accurate energy balance-sheet and there had to be a Community power of co-ordination. The new High Authority agreed that a new initiative—limited but decisive—was needed and it had therefore drawn up proposals for submission to the Council of Ministers and the Parliament.

Mr. Malvestiti doubted whether the right solution was the creation of a single Community for energy; and he was not sure whether co-operation with the other two Communities would be sufficient for the task ahead. But in his view it was important to keep those institutions which had been tested by experience and he considered it his duty to maintain the essential nature of the ECSC—the independent and direct powers of the High Authority.

He was against sudden or major change, but that did not preclude making adjustments to improve the functioning of the ECSC and to adapt it to new conditions. Defending the High Authority against allegations of failure to give due warning of dangers ahead, the president said that both the reasons behind the crisis and remedies to deal with it had been clearly stated on numerous occasions in High Authority documents. This had not prevented its opponents from resisting changes which, however urgent, might prove painful. He appealed to governments and professional and trade union organizations to co-operate in finding a solution for the problems of the coal industry.

Frederick Braby acquires Auto Diesels

The whole of the issued share capital of Auto Diesels, Limited, Uxbridge (Middx), has been acquired by Frederick Braby & Company, Limited, structural engineers, manufacturers of steel sheets and bars etc., of London, N.W.1. Of the purchase price, £309,972 has been paid in cash, the balance being satisfied by the issue of £90.000 ordinary capital, valued at 22s. 10½d. per £1 unit, the middle market price the day before the acquisition contract was signed. The vendors have agreed not to part with the ordinary shares to be received for a period of three years.

Auto Diesels, with its subsidiaries, Diesel Equipment, Limited, and Norman Industrial & Marine Engine Company, Limited, has five main divisions—electrical, oilfield, pump and hydraulic machinery, gas turbine, and aeronautical.

Mr. F C. Braby, chairman of Frederick Braby & Company, says it is anticipated that the acquisition will result in considerable benefits to the company. It is intended that the combined manufacturing facilities shall be utilized to the best advantage.

Personal

[. D. Boyd has resigned from the board of
llen & Company, Limited.

. Dummelow has been appointed publicity
of the Metropolitan-Vickers Electrical Com-
mited.

. F. Hodges has been appointed chief metal-
with the Knowsley Cast Metal Company,
Trafford Park, Manchester.

'. J. Hepworth has been appointed a director
lane and Motor Aluminium Castings, Limited,
r of the Associated Engineering group.

eorge Heywood, general manager of John
Son (Oldham), Limited, Crossbank Street,
has been appointed a director of the company.

V. Chatterton has relinquished his post with
Foundries, Limited, to take up an appoint-
production manager with High Duty Alloys,
Slough.

. Bonsall, who for four years has been a
and general manager of British Furnaces,
Chesterfield, has been appointed deputy
g director.

Marshal Viscount Montgomery will inaugu-
new engineering building at Glasgow Uni-
ext month, and during his visit will be pre-
ith the honorary degree of Doctor of Laws.

. H. Flurscheim b.a., m.i.e.e., a director and
electrical engineer of Metropolitan Vickers
Company, Limited, has been co-opted to
the Council of the British Welding Research
on.

ed Archdale and Mr. Will Archdale have
from the board of the Staveley Coal and Iron
, Limited. They will remain on the board of
diary, James Archdale & Company, Limited,
ime being.

. G. Williams has retired from his position
manager of Purimachos, Limited, fire-cement
urers. Mrs. M. J. Murray has been appointed
nager and is already operating from the com-
ad office in Bristol.

. Ball has been elected a director of H. and C.
Limited, light constructional and industrial
, Clapham Common, London, S.W.4, and has
pointed chairman in succession to Major-
A. H. Gatehouse, who has retired.

John Menzies Kay, who is Professor of
Power, Department of Mechanical Engineering,
College of Science and Technology, Univer-
ondon, City and Guilds College, is the new
of the Junior Institution of Engineers.

. Malone has relinquished his post with
Foundries, Limited, Croydon, in the Feder-
ndries group, to join the Electric Resistance
Company, Limited, as manager of the new
quipment division at Weybridge, Surrey.

. J. Baines, sales manager of Henry Balfour
any, Limited, has left England for a short
Nigeria, where he hopes to meet ministers of
Nigerian governments and discuss the wide
f development in that country's industrial
.

Carbide, Limited, Alloys Division, 103, Mount
ondon, W.1, announce that Mr. P. J.
ey has resigned from the company, and Mr.
on, divisional managing director, has temporarily assumed the responsibilities of sales manager for the alloys division.

Mr. B. Williams has been appointed resident technical sales representative at the Bristol office of Crofts (Engineers), Limited, Bradford (Yorks), in place of Mr. Dawson, who has retired. He takes up his new duties on November 2. The address of the Bristol office is 28, Queen Square (telephone: Bristol 25289).

Award of the Vickers Prize and Medal of the Junior Institution of Engineers has been made to Mr. John L. Cooper, who is with Davy-United, Limited, Sheffield, for his paper on "Steel Processes." His father, Mr. Herbert E. Cooper, a Sheffield garage owner, receives the institution's H. G. Riddle Memorial Prize for a paper on "Angles on Angling."

Mr. L. L. Boyd, at present managing director, United Steel Companies (India) Private, Limited, and director, United Steel Companies (Pakistan), Limited, is shortly to return to the United Kingdom, to take up, with effect from March 1, 1960, the position of deputy commercial manager at United Steel's Steel Peech and Tozer branch, Rotherham.

Miss Valerie Lewis, apprentice draughtswoman at Hymatic Engineering Company, Limited, Redditch, has received a five-guinea prize for her essay written for a competition organized during the Safety and Factory Efficiency Exhibition, held at Bingley Hall, Birmingham, earlier this year. The prize was awarded by the Dunlop Rubber Company, Limited.

Dr. Charles Sykes, managing director of Thos. Firth and John Brown, Limited, Sheffield, has been appointed by Mr. Aubrey Jones, Minister of Supply, to the Royal Ordnance Factories Board. Dr. Sykes was formerly superintendent of the Metallurgy Department of the National Physical Laboratory from 1940 to 1944. At the end of his time there he superintended the terminal ballistics branch of the Armament Research Department.

Dr. A. H. Sully, the director of the British Steel Castings Research Association, is attending the annual conference of the Steel Founders' Society of America in Cleveland from November 9 to 12. He has been invited to lecture to the conference on "Problems of Dust and Noise-control in Steel Foundries." This invitation is a tribute to the pioneering work which British steelfounders, through their Research Association, have carried out in the field of industrial health. As a consequence of this work, the risk of silicosis in steel foundries is being progressively diminished. While in North America, Dr. Sully is also making a number of visits to foundries and research centres in Canada and the US.

Mr. J. A. Kemp, a director of Albion Motors, Limited, has relinquished his position as the company's chief designer. His services, however, will still be available to the company in a consultative capacity. Mr. Kemp, who has been associated with the motor industry since 1905, joined the Albion Company in 1934, and during the last two years has been responsible for the design of a new range of Albion vehicles. Mr. Stead, formerly technical manager of the company, has been appointed chief engineer. Also announced by the parent company, Leyland Motors, Limited, is the retirement of Mr. J. McHugh from his post as houseman of Wellington House (the student engineers' hostel of the company), an appointment he has held since 1922. The "old boys" of Wellington House have started a fund, and a presentation to "Jim" to mark his retirement, will be made at the annual reunion to be held at Blackpool on October 17.

News in Brief

During the quarter ending September 30, Platt Bros. (Sales), Limited, a subsidiary of Stone-Platt Industries, Limited, received orders totalling more than £1,250,000 for cotton-spinning ring frames.

Dr. R. M. Bozorthm of Bell Laboratories in the United States, lectured to the Permanent Magnet Association in Sheffield City Memorial Hall on October 8. He dealt with new varieties of magnetic materials.

A slot dispenser for paraffin, providing quantities worth 2s., has been installed in a shop in Union Street, Middlesbrough. It has been invented by Mr. Fred Cottrell and made by the Erimus Engineering Company of Middlesbrough

The autumn meeting of the Institute of Welding will be held in London from November 3 to 6, and will be a joint one with the French Society of Welding Engineers, about 50 of whom will be taking part. The general subject is quality-control in welding.

Rotary Electrical Company, Limited, have opened new premises in Gilpin Street, Sheffield, covering 6,500 sq. ft. The firm which started with a staff of six in a one-floor rented workshop, now has 60 employees and the company is considering setting up its own apprentice training scheme.

Morton Machine Company, Limited, Wishaw, Lanarkshire, have received an order for dough-mixing machines worth 55,000 dollars (about £20,000) from a leading American baking concern. A further order for similar machinery valued at 200,000 dollars (about £72,000) is under negotiation.

Firth-Vickers Stainless Steels, Limited, of Sheffield, have secured an order worth over £1,000,000 for hundreds of tons of stainless steel for the Chinese People's Republic. Deliveries start at the end of this month and continue until next April. The contract was won in face of world competition.

Jagoe Kaleo, spokesman of the Ghana delegation to the forthcoming British Commonwealth Parliamentary Conference in Canberra, said in Brisbane last week, that both Ghana and Nigeria proposed to transfer some of their trade to Australia, and that Australian companies would be invited to open up Ghana's iron-ore deposits.

Facilities for the use of a landing ground for helicopters and light aircraft for the United Steel Companies, Limited, at Hady Hill, Chesterfield, have been approved in principle by Chesterfield Corporation. United Steel also recently approached Chesterfield Rural Council for permission to build an airstrip at Apperknowle, near Chesterfield.

The 20,000-ton Royal Mail liner Aragon will be launched by Lady Snedden—wife of Sir Richard Snedden, director of the Shipping Federation—at Harland & Wolff's shipyard, Belfast, on October 20. The vessel is a sister ship of the Amazon, which was launched by Princess Margaret in July. A third liner for the same company, the Arlanza, is also being built in Belfast.

Slingsby Sailplanes, Limited, Kirbymoorside, Yorkshire, have received an order from the Russian trade delegation in London for a Skylark 3B. This will be the first complete aircraft to be exported from this country to Russia. The company has produced 1,148 aircraft since 1942, and their latest overseas customers include the Aero Club of Modena in Italy, and the Club de Planeadores de Concepcion, Chile.

Alderman E. N. Hiley, secretary of the National Brassfoundry Association, was the speaker at the October luncheon meeting of the Non-Ferrous Club, held at the Queen's Hotel, Birmingham. He spoke about the traditions of the City of London which included Guildhall procedures. A collection taken at the meeting on behalf of the Birmingham Federation of Boys' Clubs, realized the sum of £17 2s. 6d.

A Meeting of Junior Engineers organized by the Iron and Steel Institute, will be held at Glasgow on October 28 and 29. The meeting will include visits to the General Ore Terminus, Clyde Iron Works, Clydebridge Steelworks and Ravenscraig Iron and Steelworks of Colvilles, Limited, the Clydesdale Steelworks and Tube Works of Stewarts and Lloyds, Limited, and the works of the North British Locomotive Company, Limited.

A half century club for employees over the age of 50 has been formed by the Rubery Owen group of companies. The club is part of the preparation-for-retirement programme on which the group is now formulating a pilot policy. Membership of the new club is open to employees who have attended the pre-retirement course. In charge of the club is Miss Grace Owen, daughter of Mr. A. G. B. Owen, chairman and managing director of the Rubery Owen organization.

The Venezuelan Ministry of Mines and Hydrocarbons has confirmed that the Government is preparing a new policy for the exploitation of Venezuela's iron-ore reserves. The deposits will be controlled by the Government, while no further exploitation concessions will be granted for the time being. One of the first steps to be taken in the execution of the new policy covers the smelting of the ores which will make it possible for the refined product to be placed directly on the world market.

The 1959 congress of the *Bureau International de la Récupération* is to be held in Düsseldorf from October 27 to 29, all meetings being held at the Rheinterrasse, Hofgartenufer, 7. The first and last days of the congress will be devoted to meetings of the various committees, and the Wednesday sessions will include, in the morning, a meeting of the scrap iron and steel section, and in the afternoon, the non-ferrous metal section. The congress will conclude with the official banquet on the Thursday evening.

It is reported that work has commenced on a $1,000,000 extension to the existing plant of Fischer Bearings Manufacturing Company, Limited, at Stratford, Ontario, Canada. The company, which is a subsidiary of Kugelfischer George Schafer & Company, Germany, was founded in 1954 and now employs 220 people. Its products include high-precision instrument bearings and aviation bearings. The new addition to the plant will house a production system for water-pump spindle bearings which has been developed in the Canadian plant.

Extensive additions are at present being made to the British Steel Castings Research Association in Sheffield. These comprise new laboratories and offices and a substantial addition to the experimental steel foundry. With these extensions, which will be completed early in 1960, the Association will have over 20,000 sq. ft. of floor-space, which will house its steelmaking, foundry processes, general metallurgy, plant engineering and industrial health sections, as well as its library and information centre and administrative offices.

At a meeting of the National Trades Technical Societies held at the East Hecla Works of Hadfields,

l, on October 6, over 45 members were present
r a paper by Mr. E. G. Gardner, patternshop
:r of Hadfields, entitled "Epoxy Resin in
making." Following Mr. Gardner's address, in
be dealt with recent developments in pattern-
: and the benefits to be gained by the use of
atterns, Mr. Cedric Platts, a patternmaker, gave
:tical demonstration on "How it should be
An open discussion concluded the meeting.

.ANS FOR BUILDING an agricultural-implement
in Chesterfield are approved by the Board of
the Sheffield firm of S. & J. Kitchen, Limited,
ɔ open the new industry in the town very
Chesterfield Corporation's Town Planning Com-
has already given their approval of the site of
tory, which, it is estimated, will cover 45,000
ɔf floor space and will probably employ up to
ple, who in the main will not be skilled. S. &
hen, general engineers and agricultural tool
have been established in Sheffield for over a

EBY-FRODINGHAM STEEL COMPANY, a branch of
United Steel Companies, Limited, are installing
ıge-oxygen plant at their Scunthorpe works at
ıated cost of £750,000. Principal contractors for
nt are Air Products (Great Britain), Limited,
ish subsidiary of Air Products Incorporated, of
wn, Pennsylvania, USA. All the structural
'k is being fabricated by United Steel Struc-
ompany, Limited, a United Steel subsidiary, and
nplete installation will be carried out by
l-Duckham, Limited.

CILLOR J. A. BROWN, of Middlesbrough, chair-
the Tees-side Smoke Abatement Committee,
over a conference at Middlesbrough to mark
ıching in the Tees-side area of a Clean Air
gn on October 5. He said that wherever there
dustries and domestic chimneys there must be
but it was hoped that in 15 years' time pollu-
uld be scarcely noticeable. Smokeless zones
ready contemplated for the area. Dr. J. G.
former deputy town clerk of Middlesbrough,
pened an exhibition in All Saints' Hall,
brough.

IE-DAY SYMPOSIUM on the "Application of
n Techniques to the Electron-microscopic
ıtion of Metals," arranged by the metal physics
ee of the Institute of Metals, will be held on
y, November 12, at the Royal Institution, 21
:le Street, London, W.1, commencing at
ı. In connection with the meeting, an informal
.zione will be held at 17, Belgrave Square,
S.W.1, on the evening of Wednesday,
er 11. Tickets, price 6s., required only for the
.zione, are obtainable from the secretary of the
, at Belgrave Square.

INSTITUTION OF PLANT ENGINEERS announces
H. A. Thomas, D.SC., M.SC., has consented to
ıaper on "An introduction to Electronic Data
ıg" at the Royal Institution on December 3.
er will be illustrated with working models,
nd films, and following the lecture, an exhibi-
luding a working computer, will be staged by
ros. (Automation), Limited. Admission will be
t only and applications for these should be
Mr. L. R. Leworthy, M.I.PLANT E., chairman
branch papers committee, the Institution of
.ngineers, 2, Grosvenor Gardens, London,

AN ORDER worth £1,500,000 for a fleet of 200 single-deck buses was received last month by Leyland Motors, Limited and Metropolitan-Cammell-Weymann Limited, from Omnibus Metropolitanos S.A. of Havana. The first batch was shipped from Liverpool last week, and regular shipments will follow until all are delivered. According to reports from Australia, Leyland Worldmaster buses, already in service for the Department of Government Transport, New South Wales, are showing a fuel saving of 8 per cent. The Department has now placed an order for another 50 of these buses, making a total of some £1,300,000 invested in this type of vehicle.

SIR HUGH CHANCE, chief speaker at the meeting of the West Bromwich and Smethwick Manufacturers' Association on October 1, said that making unskilled and semi-skilled men happy in factories was one of industry's two biggest problems. Advanced technicians were vitally important but employers should not ignore the ordinary rank and file in the plant, Sir Hugh warned, saying that "the man who sweeps the shopfloor must be treated as an important part of the set up. The effect he has on the morale and life of a factory is considerable." Problem number two, Sir Hugh said, was the need for firms to increase their training facilities to cope with the "bulge" of school leavers which would reach its peak in 1962. Potentially sound material would be lost if apprenticeship schemes were not extended. "These apprentices will be the skilled technologists industry will need in the future," Sir Hugh added.

Obituary

Mr. **THOMAS P. N. BURNESS**, chairman of Ambrose Shardlow & Company, Limited, engineers, Meadowhall, Sheffield, died suddenly on October 6, at the age of 69. He had been a director of the company for more than 12 years and was chairman for the last four years.

The death occurred on October 5 of Mr. **WALTER BLAKEBOROUGH**, a former managing director of J. Blakeborough and Sons, Limited, Brighouse (Yorks), and the eldest son of the founder of the firm. Aged 87, Mr. Blakeborough started work in the family firm when he was 13, and was taking an active part in the management by the time he was 20. Under his management, the firm expanded rapidly, but ill health forced him to retire in 1923, though he retained his seat on the board until 1946. Mr. W. Ralph Blakeborough, the present managing director of the firm, is his son.

Recent Wills

REID, R. J. C., former manager of the Belfast Ropework Company, Limited, Hull (Yorks)	£74,828
YATES, ALEC, a director of Yates Bros. (Norton Canes), Limited, boat builders and repairers, etc. ...	£17,553
NORTON, HORACE, a founder member of the Norton-Marty Engineering Company, Limited, Tipton (Staffs)	£11,807
ALLEN, G. W., a director of the Dronfield Casting Company, Limited, Dronfield (Derbyshire), and the associated Dronfield Tool Company, Limited	£16,396
WILSON, A. H., managing director of Evered & Company, Limited, brassfounders, tubemakers, etc., of Smethwick (Staffs), and president of the National Brassfoundry Association during its diamond jubilee celebrations last year	£75,243

Raw Material Markets

Iron and Steel

Current usage of pig-iron is not calling for any appreciable increase in supplies and producers generally have no difficulty in fulfilling demands from outputs. They still hold fairly large stocks in most grades of pig-iron. As long as this position lasts it is unlikely that additional furnaces now out of production will be brought back. In many instances those now in blast are working below capacity levels. The steelworks are now using larger quantities of raw materials to obtain increased ingot production, but with good supplies of suitable scrap available the use of pig-iron is reduced. Adequate supplies of basic steel making pig-iron are available and current production can be stepped up as demands warrant.

In the foundry grades of pig-iron consumers' requirements are met satisfactorily. The low-phosphorus irons, which continue in much bigger demand compared with other grades, are in good supply. The overall quantities available from the several sources now supplying this type of pig-iron are sufficient to satisfy the needs of the engineering and speciality foundries. Hematite pig-iron is also plentiful, and refined iron makers have capacity available to enable them to take on business on a much larger scale. High-phosphorus pig-iron makers are in need of more orders fully to absorb current outputs, and the stocks on hand at the furnaces are appreciable.

The present pig-iron supply position does not warrant the foundries carrying large stocks and only those tonnages required for work on hand and current stock are being requisitioned. Export orders, mostly for the high-phosphorus irons, account for a fairly reasonable tonnage.

Varying grades of activity still exist at the foundries. Production of high-duty castings continues on a good scale with the motor vehicle trade in the forefront of consumers. The machine-tool trade continues to show some improvement, but from railways, collieries, and some of the engineering trades demands remain low. The light-castings trade continues to improve on certain types of castings, notably for the domestic utensil trade but there is still room for improvement. The jobbing foundries maintain a fair rate of production, but the textile foundries are only moderately employed.

The foundries are able to obtain most of their scrap requirements without difficulty. Foundry coke is coming to hand satisfactorily, and ganister, limestone, and firebricks are readily available.

There is a substantial call for steel semis from all areas and the supplying steelworks are committed for their outputs for some weeks ahead—in some instances up to the end of the year. Increasing demands for small bars and light sections are being received by the re-rollers and those supplying reinforcing rods have heavy order-books. All arisings of suitable re-rolling defectives and crops are easily disposed of by the steelworks.

Non-ferrous Metals

Towards the end of last week, President Eisenhower took action to halt the national steel strike by invoking the Taft-Hartley Act on the grounds that "the national interest demands an immediate resumption of production in this vital industry." Yet "experts" are completely at variance on their estimates as to how long it will be before the industry is back in full production. More important, however, is the fact that the issues which made up the dispute are no nearer to being solved and the outlook is for a resum tion of the strike after the 80-day cooling off p unless some mutually agreed basis for compr can be found.

The Taft-Hartley Act has now been used to up both the dock strike and the steel strike, can hardly be operative in the case of the c industries' dispute as this strike could not conce come under the heading of creating a national gency. The present position is that the US c strike looks like going on indefinitely as no than half-hearted attempts have so far been mad find a *modus operandi*. Stocks are, therefore, disappearing and the fact that the one operating cu tom smelter in the US has quoted 33 cents a pou only for December and January indicates that it h no copper to offer in October and November. I these circumstances US traders have been asking, a getting, 34 cents a pound for November delivery and, for a brief period, when the fate of the dock strike stood in the balance, prompt metal was fetching a much as 36½ cents a pound, equivalent to £292 a ton.

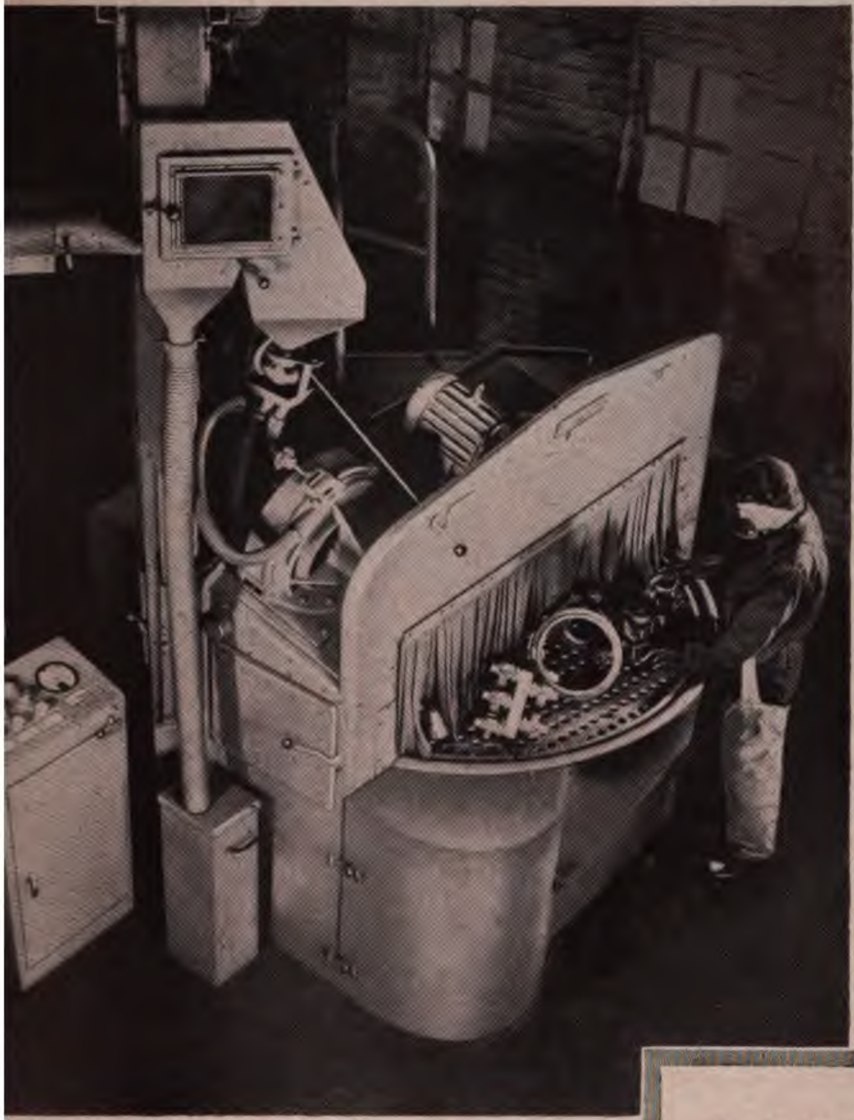
The Braden copper strike at the El Teniente is now in its second week, and while the labour uni have accepted the Chilean Government's propo for a settlement, the company has set some con tions the acceptance of which by the unions has to be agreed. The strike of transport workers in Belgian Congo also continues.

Strangely enough, the London market has not b fited pricewise from these various strikes. Liquid of bull positions has kept the price down and quotation at the beginning of this week showe decrease compared with the previous week. How the outlook must be considered bright. This would be enhanced if the US steel industry were get into its stride quickly and some reasonable tures were made with regard to settling all the outstanding. As it is, the strike at the Braden co mine cut this country off from a high proportion the 16,000 tons a month produced by this mine. answer may be that the LME has yet to con the present situation serious with the weight of co available in stocks. Yet the fall last week, by 1 tons to 11,547 tons, could be the preamble to scramble which could ensue.

The tin market is now firm. This is more mere papering over of the cracks, as demand is in London and in the East, while continental is satisfactory. Indeed, the price has now rea another 1959 peak and the outlook is good enough to predict that the buffer stock manager should be enabled to unload his stocks with impunity. In the US the market is very patchy because of the steel strike, but this should now pick up perceptibly. The US price is hovering around $1.03 a pound.

Lead is steady, but featureless, both in London and in New York. In London the price is struggling to maintain itself at £70 a ton and in America it is holding at 13 cents a pound. Zinc is a better market in London than in New York, where the price is unchanged at 12 cents a pound. Demand is good and with consumers concentrating on prompt metal, which is scarce, the undertone is very firm and the outlook good. Should the US steel industry come to some amicable settlement as to future operations, the US market should pick up considerably.

Brown Bayley, Limited—Mr. Robert Barnaby, who is managing director of Brown Bayley Steels, Limited, has been appointed a director.



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HISTORICAL NOTE

Peter Brotherhood Ltd. were established in London in 1868. In 1907, the works was transferred to Peterborough, Northants. In their Foundry, they produce a wide range of general engineering castings for air and gas compressors, steam turbines, steam engines, refrigeration plant, water turbines, chemical filtration plants, textile machinery, brewery machinery, and many other applications

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

October 14, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 10-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 5d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 5d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy). —4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £232 5s. 0d. to £232 15s. 0d.; three months, £232 5s. 0d. to £232 10s. 0d.; settlement, £232 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3½d. per lb.; rods, 248s. 0d. per cwt. basis; 20 s.w.g., 283s. 0d. per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £794 0s. 0d. to £794 10s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—First half October, £70 0s. 0d. to £70 2s. 6d.; first half January, £71 5s. 0d. to £71 7s. 6d.

Zinc.—First half October, £88 15s. 0d. to £89 0s. 0d.; first half January, £86 10s. 0d. to £86 12s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 10s. 0d.; rolled zinc (boiler plates), all English destinations, £120 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £101 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10½d. per lb.; sheets to 10 w.g., 202s. 9d. per cwt.; wire, 2s. 8½d.; rolled metal, 202s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £154; B6, £202.

Brass (High Tensile).—BS1400, HTB1, £189; HTB2, £201; HTB3, £215.

Gunmetal.—BS1400, LG2, £192; LG3, £202; G1, ½%, £252; G1, 1%, £241.

Phosphor Bronze.—BS1400, PB1 (AID released), £288; BS1400, 90/10/1, £268.

Leaded Phosphor Bronze.—BS1400, LPB1, £211.

Phosphor Bronze Strip, etc.—Strip, 290s. 3d. per cwt.; wire, 4s. 1d. per lb.; rods, 3s. 4d.; tubes, 3s. 4d.; chill cast bars: solids 3s. 3½d.; cored 3s. 4½d. (Charles Clifford, Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide x 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £236; AB2, £247.

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* Average 68–70 per cent.

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Pig-iron and Steel Production

Statistical Summary of July Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in July. Table 3, weekly average production of finished steel in June. Table 4 gives the production of pig-iron and ferro-alloys in July, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period		B.o.T. Price Index, 1954 = 100: Iron and steel	Coal	Basic materials[1]	Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy): Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[3]
1957		328	488	537	325	303	270	275	220	14	417	322	1,444
1958		343	503	478	276	262	227	245	196	9	369	284	1,542
1959	Apl	342	504	476	299	219	201	231	211	5	387	297	1,459
	May	342	487	478	292	236	203	240	211	8	385	285	1,457
	June[4]	338	487	475	285	232	204	235	214	9	388	292	1,425
	July	338	487	472	275	226	201	222	169	7	320	—	1,436

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in July, 1959.*

District.	Open-hearth. Acid.	Open-hearth. Basic.	Bessemer.	Electric.	All other.	Total. Ingots.	Total. Castings.	Total ingots and castings.
Derbys, Leics, Notts, Northants and Essex	—	4.0	13.7(basic)	1.5	—	18.1	1.1	19.2
Lancs (excl. N.W. Coast), Denbighs, Flints, and Ches Yorks (excl. N.E. Coast and Sheffield)	0.5	30.8	—	4.2	0.3	34.7	1.1	35.8
Lincs	—	40.3	—	—	0.1	40.3	0.1	40.4
North-East Coast	0.4	52.4	—	1.0	0.3	52.8	1.3	54.1
Scotland	0.5	17.7	—	1.3	—	18.6	0.9	19.5
Staffs, Shrops, Worcs, and Warwicks	—	14.8	—	2.6	0.6	16.6	1.4	18.0
South Wales and Monmouthshire	1.9	81.8	7.2 (basic)	0.7	0.1	91.4	0.3	91.7
Sheffield (incl. small quantity in Manchester)	5.8	22.6	—	8.9	0.3	36.2	1.4	37.6
North West Coast	0.1	0.4	3.1 (acid)	0.4	—	3.9	0.1	4.0
Total	9.2	264.8	24.0	20.6	1.7	312.6	7.7	320.3
June, 1959[4]	13.5	320.8	24.9	27.2	2.1	378.3	10.2	388.5
July, 1958[4]	13.7	260.6	22.4	17.4	1.8	307.5	8.4	315.9

TABLE 3.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1957.	1958.	1958. June.	1959. May.	1959. June.[4]
Non alloy steel:					
Ingots, blooms, billets and slabs[5]	5.0	4.6	3.9	5.1	4.9
Heavy rails	11.2	10.2	12.8	7.3	7.4
Sleepers	1.3	1.2	1.7	0.5	1.0
Fish and soleplates	0.8	0.7	0.9	0.6	0.6
Plates					
(i) Over ⅛ in thick	34.0	29.6	32.0	23.8	23.2
(ii) Under ⅛ in	20.3	17.7	18.5	18.8	19.3
Other heavy prod	53.0	41.8	44.4	41.4	39.2
Ferro concrete bars[5]	8.9	7.6	8.3	8.7	10.6
Wire rods	23.3	21.5	21.0	24.2	25.4
Arches, etc	11.0	8.6	8.4	8.5	7.9
Other light sections	38.7	29.1	27.9	30.5	33.7
Bright steel bars	7.0	6.2	6.3	7.1	7.5
Hot rolled strip	23.1	22.6	23.2	26.9	29.0
Cold rolled strip	7.1	7.0	7.0	7.3	8.1
Sheets,					
(i) Hot rolled	13.0	10.6	10.8	10.1	12.6
(ii) Cold rolled	29.1	31.1	31.8	34.7	35.5
Tinplate	18.8	18.7	20.3	20.5	20.7
Blackplate	1.0	0.8	0.8	0.6	0.7
Tubes up to [illegible] in	22.1	19.0	21.4	18.1	20.1
Tubes and pipe fittings	[illegible]	0.4	0.4	0.4	0.3
Tyres, wheels, axles	[illegible]	4.[illegible]	3.6	2.6	2.2
Forgings (excl. drop)	3.[illegible]	2.6	3.0	[illegible]	2.0
Steel castings	4.3	4.2	4.9	[illegible]	3.6
[illegible]	[illegible]	[illegible]	[illegible]	.3	0.2
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys, Leics, Notts, Northants and Essex	17	0.5	20.4	16.9	1.2	—	39.0
Lancs (excl. N.W. Coast), Denbighs, Flints, and Ches	7	—	21.6	—	—	1.4	23.0
Yorks (excl. N.E. Coast and Sheffield)	—	—	—	—	—	—	—
Lincs	8	—	39.8	—	—	—	39.8
North-East Coast	17	3.0	39.8	—	—	0.7	43.5
Scotland	5	0.2	13.2	0.6	—	—	14.0
Staffs, Shrops, Worcs, Warwicks	4	—	5.6	0.9	—	—	6.5
S. Wales and Monmouthshire	10	2.8	49.5	1.0	—	—	53.3
Sheffield	2	—	3.5	—	—	—	3.5
North-West Coast	7	11.6	—	0.2	—	0.9	12.7
Total	77	18.1	193.4	19.6	1.2	3.0	235.3
May, 1959	80	19.0	198.5	17.3	1.4	4.3	240.5
June, 1958	88	23.7	193.4	22.0	0.6	3.5	243.2

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[1] Used in non-food manufacturing industries.

[2] Weekly average of calendar month.

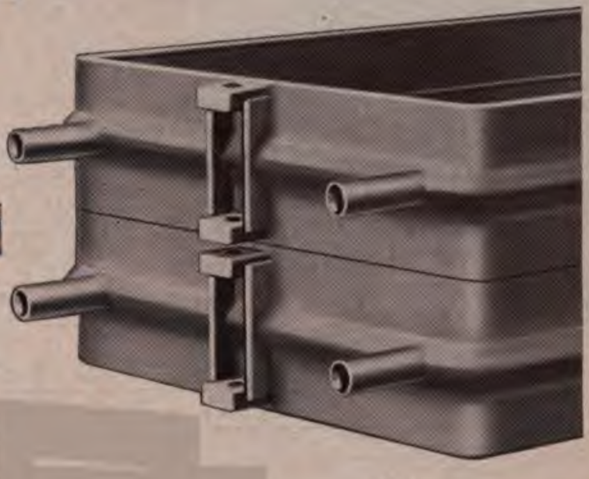
[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.

[4] Five weeks, all tables.

[5] Other than for conversion into any other form of finished steel listed.

[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.

[7] Material for conversion into other products also listed in this table.



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Book Review

Out of the Sky—An Introduction to Meteoritics, by Dr. H. H. Nininger. Published by Dover Publications, Inc., 180, Varick Street, New York, 14, N.Y., USA; price $1.85 (approx. 13s.).

Dr. Nininger's book is a comprehensive, non-technical introduction to meteoritics—one of nature's most dramatic phenomena. It is of special interest to-day since the problem facing space-scientists concerned with the safe re-entry of space vehicles into the earth's atmosphere can be considered in relation to a phenomenon that has fascinated man for ages.

The author reveals that over 24,000,000 meteorites enter the earth's atmosphere each day. Of these, only one out of every 2,600,000 ever reaches the surface of our planet. The others, rushing into the atmosphere at 21 miles per second, are completely consumed by the enormous heat of friction generated by their motion through the air. The barrier of our atmosphere is so effective against these intruders from outer space that even the few surviving meteorites are rarely large enough to cause any damage. When a big meteorite does land, however, the results can be spectacular. On June 30, 1908, a meteorite landing at Tunguska Basin, Central Siberia, was heard 350 miles away. The tremor shook down houses within a radius of 20-30 miles, and the rush of air from the point of impact flattened more than 700 square miles of forest. The book, profusely illustrated, describes other famous meteorite landings and craters, and also tells how to locate, identify and preserve a meteorite that has survived its fall through the atmosphere.

House Organs

This is Magnesium. No. 1. Issued by the Magnesium Industry Council, Dickens House, 15, Tooks Court, London, E.C.4.

Like most JOURNAL readers, the reviewer always thought the outstanding feature of magnesium was its lightness, but now he learns from this magazine that it is the fastest machining engineering alloy. Machining costs so much these days that any reduction here can materially influence the profit and loss account. The examples of the uses of magnesium in industry in the booklet have been well chosen and excellently produced.

Nickel Bulletin—August, 1959. Published by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

The 70 or so abstracts published in this issue of the *Bulletin* cover electrodeposition; the use of nickel/iron films in digital computers and, in the section on cast iron, the inoculation of castings by vibration during solidification. Other abstracts are concerned with nickel-containing constructional steels and heat- and corrosion-resisting materials.

New Catalogues

Storage Bins. A leaflet received from Precision Components, Limited, 13, Byng Road, Barnet, Herts, details and prices a line of moulded-resin, stackable storage bins, trade marked "Kabi Plastibox."

Paint Removal. Southern Metalife, Limited, Station Square, Harrogate, have issued a folder detailing the properties of a material called Metastrip, which has been specially compounded to remove old paint and *prepare iron and* steel surfaces for further treatment.

Increases in Capital

ELBIEF COMPANY, LIMITED (formerly Warstone Eng Company, Limited, Birmingham, increased by £52,50 ordinary shares, beyond the registered capital of £

S. DODD & SONS (MACHINERY), LIMITED, textile-m manufacturers, etc., of Oldham, increased by £19,90 ordinary shares, beyond the registered capital of £

SAUNDERS & TAYLOR, LIMITED, heating and ve engineers, etc., of Manchester, increased by £50,000 ordinary shares, beyond the registered capital of

WELMIC CORPORATION, LIMITED, mechanical, electri general engineers, etc., of London, W.C.2, increased by in £1 ordinary shares, beyond the registered capital

POCKLINGTON & JOHNSON, LIMITED, precision sprin facturers, etc., of Welwyn Garden City (Herts), incr £10,000, in £1 ordinary shares, beyond the registered of £20,000.

SATELLITE ENGINEERING, LIMITED, East Hoathly increased by £10,000, in £1 8 per cent. non-cu redeemable preference shares, beyond the registered of £1,000.

BURNETT & LEWIS, LIMITED, humidifier manufacturer Redhouse Industrial Estate, Aldridge (Staffs), incr £10,000, in £1 ordinary shares, beyond the registere of £10,000.

PNEUMATIC COMPONENTS, LIMITED, Sheffield, incre £99,350, in 25,000 10 per cent. cumulative preferen and 74,350 ordinary shares of £1, beyond the registere of £100,650.

T. B. PEARSON & SONS (ENGINEERS), LIMITED, Walk castle-upon-Tyne, increased by £10,000, in 5,000 ordinary and 5,000 redeemable preference shares of £ the registered capital of £50,000.

E. STEPHENS & SON, LIMITED, general engineers, London, E.C.1, increased by £20,000, in 15,000 ordi 5,000 5 per cent. redeemable preference shares of beyond the registered capital of £10,000.

G. A. HARVEY & COMPANY (LONDON), LIMITED, meta tors, tank makers, etc., of London, S.E.7, incr £1,000,000, in £1 6½ per cent. 2nd cumulative preferen beyond the registered capital of £2,250,000.

B.S.A. SMALL TOOLS, LIMITED, Birmingham, incr £79,000, in £1 ordinary shares, beyond the register of £150,000.

METAL CLOSURES, LIMITED, West Bromwich (Staffs), by £400,000, in 4s. ordinary shares, beyond the capital of £600,000.

STAFFORD TOOL & DIE COMPANY, LIMITED, Stafford, by £7,000, in £1 ordinary shares, beyond the capital of £10,000.

J. C. PEACOCK (ENGINEERS), LIMITED, Birmingham, by £20,000, in £1 ordinary shares, beyond the capital of £10,000.

CARDIFF FOUNDRY & ENGINEERING (1947), LIMITED, ham, increased by £36,000, in £1 ordinary shares, b registered capital of £50,000.

PRECISION ALLOY CASTINGS (BIRMINGHAM), LIMITED, ham, increased by £11,900, in £1 ordinary share the registered capital of £100.

WHITE & POOLE, LIMITED (ENGINEERS), LIMITED, W (Staffs), increased by £18,000, in £1 ordinary share the registered capital of £2,000.

COATED STRIP, LIMITED, ironfounders, steelmakers Walsall (Staffs), increased by £35,000, in £1 ordina beyond the registered capital of £5,000.

BURTON, GRIFFITHS & COMPANY, LIMITED, engineer Birmingham, increased by £316,000, in £1 ordina beyond the registered capital of £120,000.

FURNIVAL & COMPANY, LIMITED, printers' engineer Stockport (Ches), increased by £50,000, in £1 ordina beyond the registered capital of £50,000.

F. T. MYERSON, LIMITED, steel, iron, and metal wo of London, E.C.1, increased by £10,000, in £1 ordina beyond the registered capital of £10,000.

DEAN & LOWE, LIMITED, engineers, millwrights, founders, etc., of Stoke-on-Trent, increased by £89, ordinary shares, beyond the registered capital of

B.G. MACHINERY, LIMITED, machine-tool reconditi dealers, etc., of Birmingham, increased by £156, ordinary shares, beyond the registered capital

JAMES WILDE & COMPANY, LIMITED, boilermakers and etc., of Ashton-under-Lyne (Lancs), increased by £1 ordinary shares, beyond the registered capital

B.S.A. BROACH COMPANY, LIMITED, manufacturers ments and tools, etc., of Birmingham, increased in £1 ordinary shares, beyond the registered £50,000.

TROUGHTON & YOUNG, LIMITED, electrical, mechan ing, and general engineers, etc., of London, S.W.3, by £399,900, in £1 ordinary shares, beyond the capital of £100.

DOUGLAS ALLEN, LIMITED, constructional engineer Croydon (Surrey), increased by £23,750, in 4,000 8 preference shares of £1 each and 395,000 ordinary sh each, beyond the registered capital of £1,250. deferred 1s. shares in the existing capital have verted into ordinary shares.

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T. 1902 TRADE JOUR

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRAD

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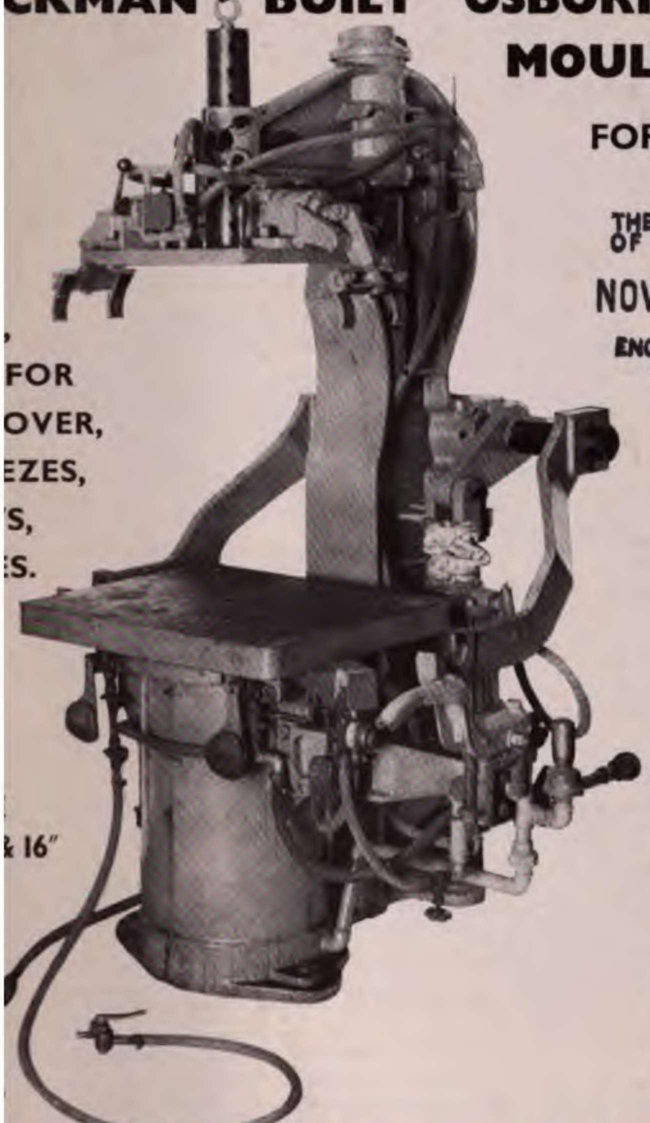

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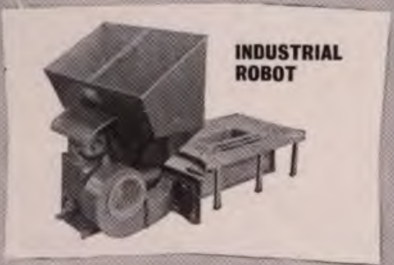

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E

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CORE SHOP PLANT

August
LIMIT

Photograph shows:
A section of the Core Shop Plant in a Large Ironfoundry. Two large Rotary Storage Hoppers feed the Wet Sand on to a Belt conveyor and then to a Belt and Bucket Elevator to the Gas Fired Rotary Sand Drier. The dried Sand is then Pneumatically conveyed to Large Storage Hoppers in the Mixing Section

Photograph published by courtesy of The Hill Top Foundry Co., Limited,

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer.

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FOUNDRY
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China and Steel

One of the greatest experiments ever undertaken is detailed in a fascinating article by Brian Crozier, published in *Steel Review No.* 15, a magazine issued by the British Iron and Steel Federation from Steel House, Tothill Street, London, S.W.1. It was the result of a publicity drive by the Chinese, who realized that to be a great power they must have a steel production comparable with the leading nations. According to the New China News Agencies, " over 6,000 small converters and other furnaces have been built in Peking in the past few weeks. Cadres from Government departments and factory workers, school-teachers, students, housewives, and peasants from communes on the outskirts have all taken part in this work."

All this is reminiscent of the British effort to collect scrap in wartime, even to the demolition of railings around parks and people's houses—a campaign which was ended by air raids. Local demand for scrap soon comes to an end, however, and the cost of transport for small quantities results in an ever-mounting expense. Moreover, scrap is not a definite entity and unless carefully sorted, its distribution and remelting results in metallurgical difficulties and a reduced output of inferior quality. Thus, it is not surprising that the otherwise laudable Chinese scheme, with its obviously excessive strain on voluntary workers, was abandoned—and that the " backyard steel " project in China met with economic disaster.

It is obvious that China will need to build up a huge iron and steel industry, to replace that which was ruined by years of civil war. One large establishment, created between 1908 and 1910, was the Hanyang Iron & Steel Works at Hankow, and it is feared this must have been among those destroyed, for it is no longer mentioned as a major producer. It is not at all certain that China will continue to rely on Russia for all its steelmaking and foundry plant in the future. What is clear from this JOURNAL's ever-increasing circulation in China, is that great interest is being taken in British metallurgical developments and, if we interpret correctly the future stability of the political field, there is a good chance of UK suppliers regaining what was once a traditional British market.

Dinner

FOUNDRY TECHNICAL GROUP

Last Saturday, about 60 members and guests of the Foundry Technical Group had dinner at the Star & Garter Hotel in Wolverhampton. The Group is comprised of past students and past and present staff of the National Foundry College and its predecessor, the British Foundry School. Mr. J. Bamford, principal of the College, was in the chair, and after the loyal toast, referred to the absence, for the first time out of 14 such functions, of Dr. J. G. Pearce, C.B.E., the president of the Group. (Dr. Pearce was attending the post-Congress tours of the International Foundry Congress in Madrid.) Mr. Wrightson of the College staff proposed the toast to "The Guests" and Mr. A. R. Parkes (assistant editor of the JOURNAL) responded. Dr. P. Samuel (Her Majesty's Inspector for Education) proposed the toast of the Foundry Technical Group, and to this, Mr. J. B. McIntyre (secretary of the Group and senior lecturer of the College) replied. Topics discussed during the evening were the new sandwich course to be organized by the College, the status of its intake and its prospects.

In the afternoon of the same day, the annual meeting of the Group was held and there was an exchange of members' experiences during the year. The guest speaker on this occasion was a prominent member of the Birmingham Stock Exchange.

Forthcoming Events

OCTOBER 27

Institution of Plant Engineers

South Wales branch: "Properties of Molybdenum Disulphide and its Use as Plant Engineering Material," by H. Peter Jost, 7.30 p.m., at the South Wales Engineers' Institution, Park Place, Cardiff.

Combustion Engineering Association

North-western Region: Discussion on "Problems in Oil-firing and their Solution," opened by J. Scott, 2.30 p.m., at the Engineers Club, Albert Square, Manchester.

Institute of British Foundrymen

Slough section: "Casting Defects," by J. L. Francis, 7.30 p.m., at the Lecture Theatre, High Duty Alloys, Limited.

OCTOBER 28

Institution of Mechanical Engineers

Applied Mechanics group: "Strength of Thick Cylinders subjected to Repeated Internal Pressure," by Prof. J. L. M. Morrison, Prof. B. Crossland and J. S. C. Parry, 6 p.m., at 1, Birdcage Walk, Westminster, London, S.W.1.

Institute of British Foundrymen

Birmingham branch: "Modern Trends in Gating Systems," by G. L. Turner, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

OCTOBER 29

Southampton Metallurgical Society

"Nimonic Alloys," by Dr. Betteridge, of the Mond Nickel Company, Limited, 7.15 p.m. in the Engineering Block, Southampton University. (The meeting coincides with a Mond Nickel exhibition at Marlands Hall, and the company has arranged for a coach to be at the disposal of visitors wishing to go on to the meeting.)

OCTOBER 30

Institute of British Foundrymen

Falkirk section: "Grey-iron Castings," by A. G. Fuller, 7.30 p.m., at the Temperance Cafe, Lint Riggs.

OCTOBER 31

Institute of British Foundrymen

Sheffield and district branch: Branch dinner/dance, 6 for 6.30 p.m., at the Grand Hotel, Sheffield.

Efco's Foundry Division

Efco, Limited, located at Weybridge, Surrey, announce the formation of a new division to extend their interests in the foundry trade industry. The company already supplies a wide range of equipment for drying cores and moulds and for the heat-treating of castings, and new products will include gravity die-casting machines, portable electric mould-driers, shell-moulding and shell-closing machines.

e Foundry Industry of the United Kingdom . . .
. . . its Organization and Capacity*

(*Continued from page* 316)

By A. R. Parkes

In last week's issue, the manufacturers' and employees' associations were dealt with, and also the set-up of the British Cast Iron Research Association. In this concluding section, two further research associations are first described. Then, under the main heading of Technology, the various activities of the Institute of British Foundrymen are quoted. An account of other foundry technological groupings follows and the Paper ends with sections on supplies and equipment associations and other contributing bodies to the foundry industry. Details of the industry's capacity, and production statistics, are set out in Tables 3 to 5.

British Non-Ferrous Metals Research Association

t possessing its own research association and g insufficient funds to maintain collective re- h independently, the Association of Bronze Brass Founders has effected a happy liaison eby, for a trifling sum of much less than a y per £ of foundry wages paid, ABBF mem- may participate in and benefit from research done by the British Non-Ferrous Metals arch Association (BNFMA). This is effected igh the ABBF Technical Advisory & Research p which has a strong liaison with the MRA, and much work to the advantage of founders generally has been pursued.

like the British Cast Iron Research Associa- the Non-Ferrous Association has no call on nally-levied finance from industry, though for sum put into the Association by members, SIR contributes a scaled amount from money cted through the country's national taxation m. However, it must be realized that the MRA caters also—in fact mainly—for ght non-ferrous metals producers, founders the "poor relations" of the Association.

l BNFMRA members are either firms join- ndividually or firms joining through one of group schemes operated in conjunction with us trade associations. Any firm having an est in non-ferrous metals (meaning firms ing in aluminium, magnesium, or other non- us metal in addition to copper-base metal) r as a manufacturer or as a user of these ls, can join the Association at a subscription mined in accordance with its size and interests. e case of firms operating in the foundry in- y, an attempt is made to relate the subscrip- to the wages bill of the foundry operatives. a number of firms operating foundries have d the BNFMRA as individual members, pay- ither the minimum subscription or whatever propriate, but the Association of Bronze and Founders also has its own research group ted to the BNFMRA.

rrent work in hand by the BNFMRA on lf of founders includes the following projects: rovement in Copper-alloy Foundry Practice"; er Porosity in Copper-base Alloys"; "Impurities in Copper-alloy Castings," and "Zinc-base Die-casting Alloys." Other general subjects take in such topics as hot-dip galvanizing, defects in plated zinc-alloy die-castings and refractories for melting furnaces, all of which have some application to foundrywork.

British Steel Castings Research Association

Until 1950, UK research on steelfounding materials, melting and moulding processes, etc., was carried on at the laboratories of the British Iron & Steel Research Association (BISRA), then housed at Battersea, London, and in Sheffield. In that year, however, having agreed amongst themselves a scheme for improved finance, the steelfounders set up their own research organization, namely, the British Steel Castings Research Association (BSCRA). Two years ago, the Association finished the building of new laboratories and it is now firmly established with excellent equipment in well-staffed premises at East Bank Road, Sheffield.

Features of BSCRA work include co-operation with plant suppliers, as, for example, in the development of exhaust systems for pedestal grinders and swing-frame grinders; the design of moulding machines, and sand-reclamation plant. An exposure calculator for gamma radiography has been placed on the market by the Association. Although the new laboratories were only opened in June, 1957, they are at present staffed by 54 persons, of whom 30 are technically trained and, of course, work is also arranged through the staffs of member firms and the research departments of universities.

At present, the chief projects on which research is in hand include the following:—*Steelmaking:* Oxygen-injection in basic-arc furnaces and gas-flushing of liquid steel. *Foundry Processes:* The effect of mould materials on the surface quality of steel castings; flowability of moulding sands; the CO_2/silicate process; kaolinitic clays; mould- and core-bonding agents. *Metallurgy:* Microporosity in steel castings; magnetic properties, and heat-treatment. *Plant Engineering:* Sand reclamation; moulding-sand compaction and moulding machines; shotblasting and chemical cleaning. *Industrial Health:* Assessment of atmospheric dust-hazards; efficiency of dust collectors; dust control of small tools, and noise abatement.

h Investment Casters' Technical Association BICTA)

s than a year old, this Association (secretary, . Bolton, 5, East Bank Road, Sheffield, 2) has formed to provide a forum for technological sions arising between UK makers of precision-ment castings. Full membership is confined ms making castings by processes in which dable patterns—of wax, frozen mercury, etc.—are used. The first annual conference e Association was held in London. During 39-45 years, and to a decreasing extent since, ajor applications of investment castings have connected with the aircraft industry, but increasing business has been sought and amongst general-engineering applications. uses for products of investment founders indeed been found in components previously ced by forging, machining from the solid or ldments; thus attracting new business to the ry industry.

oring Firms and (Metal) Development Asso-iations

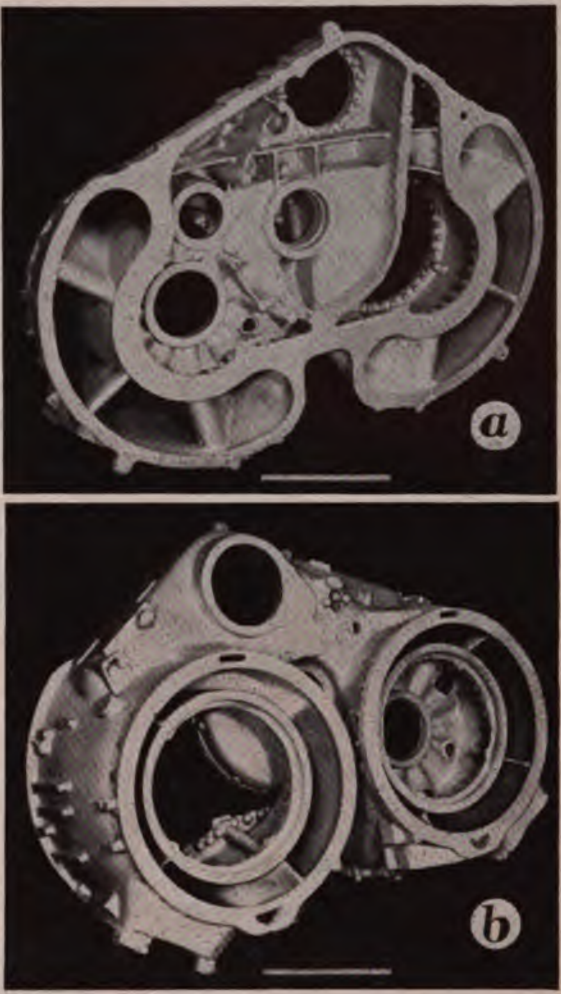
UK foundry industry enjoys valuable co-tion and technical support from a number of organizations and large firms, many of which an interest in encouraging increased usage of s and other materials. Amongst these may be d the Mond Nickel Company, Limited (which tes a large research and development depart-at the disposal of both ferrous and non-ferrous lers), the Tin Research Institute, Copper lopment Association, Zinc Development Asso-n, Aluminium Development Association, all of which place a wealth of technical information and practical research freely at the disposal of founders.

Typical of this type of activity is the establishment operating as the Association of Light Alloy Refiners and Smelters (technical offices, 3, Albemarle Street, London, W.1). Formed by the amalgamation of ALAR and the Federation of Light Metal Smelters, this Association represents the collective interests of the leading aluminium-alloy refiners in the UK in both commercial and technical matters.

4.—Grey-iron and Malleable Production—UK Figures sub-vided according to Types of Castings (in Thousands of Tons).

n fields of consumption.	1956.	1957.	1958.
g and municipal (pipes, rs, manhole covers, baths, ary goods)	324.6	331.7	298.0
and heating apparatus, ding radiators	197.7	193.2	174.7
omestic appliances	9.7	12.4	12.5
nd fittings for gas, water, ge, etc.	684.3	531.6	499.8
ning	39.7	37.6	33.5
l chemical plant	47.2	43.7	40.6
ity generation and dis-tion	118.7	130.6	118,7
ar and cycle industry ding tractors)	344.5	364.0	397.0
equipment	313.4	344.5	345.3
lding	84.2	76.8	68.9
novers (turbines, engines) nd use	92.2	79.4	79.6
ouse plant for industry,	54.1	49.6	45.3
ture (including tractors)	165.5	203.1	212.4
tools	221.6	204.4	173.7
machinery	121.4	101.2	82.6
pumps and compressors	97.2	93.5	87.1
oulds for steel and non-s metal manufacture	429.6	434.4	360.8
d steel works plant and for mills	147.0	162.4	149.
nd conveyors for industry, port, etc.	57.0	54.2	48.3
and paper machinery	33.0	33.9	29.5
elds	316.6	232.9	210.7
tals	3,899.2	3,715.1	3,468.6*

* 53 weeks.



Interior (a), and exterior (b), of an Armstrong Siddeley "Double Mamba" aircraft-engine air-duct in magnesium/zirconium alloy R.Z.5, made by Sterling Metals, Limited, England. The as-cast weight is 448 lb. (fettled weight 208 lb.), and over-all dimensions approximately 4½ by 3 by 1 ft. Forty or more cores and a number of chills were needed and X-ray inspection involved the taking of 22 separate radiographs.

In magnesium-alloy founding, collective assistance and co-operation is available mainly through Magnesium Elektron, Limited (MEL), (Clifton Junction, Swinton, Manchester), the primary UK producers of the metal. Here, work covers the whole of the magnesium field, but the emphasis is on new alloys and alloying methods, protective treatments, etc., rather than on foundry developments *per se.* This information is made generally available and technical service is supplied to all magnesium founders. Information on zirconium alloys is given to MEL licensed customers who alone are able to make these products in the UK. By arranging occasional meetings with its customers and in other ways, MEL help to promote liaison between different British founders and their principal counterparts abroad.

It would be inexcusable to close this section without mention of the services rendered the UK foundry industry by other Technical Institutes, many of which have sessions and sometimes conferences on foundry subjects. Chief amongst these are the Iron & Steel Institute, Institute of Metals, Institution of Mechanical Engineers, Institution of Metallurgists, Institution of Production Engineers and the British Iron & Steel Research Association (BISRA).

SUPPLIES AND EQUIPMENT ASSOCIATIONS

Over the last 10-20 years, the United Kingdom has changed from being an importer of foundry plant, supplies and equipment, to one of the world's largest exporters of such plant. Excluding mechanical-handling plant, mechanization equipment or material (such as abrasives, etc.), UK exports in 1956 of foundry plant and equipment totalled £989,000 as compared with home trade to the value of £3,960,000 (see Table 5). In addition, of course, there is considerable UK export business in pattern equipment and foundry materials and supplies.

TABLE 5.—*UK Home and Export Trade in Foundry Equipment in the Year* 1956.*

	Value of deliveries × £1,000		
	Export.	Other orders.	Total.
(1) Sand-preparing machines (i.e., mills, disintegrators, etc.) ..	276	586	862
(2) Moulding machines and moulding boxes	335	917	1,252
(3) Shotblast plant	124	1,001	1,125
(4) Melting equipment (including ladles)	63	320	383
(5) Coremaking machines, plant and accessories	40	145	185
(6) Other equipment, including chaplets and studs (but excluding mechanical-handling plant or mechanization equipment and materials such as abrasives, etc.)	151	990	1,141
Totals	989	3,960	4,949

* Latest statistics available at time of compilation.

Foundry Trades' Equipment and Supplies Association

The premier UK association collectively covering the interests of firms making foundry equipment and supplying raw materials (other than pig-iron, coke, scrap, etc.) is the Foundry Trades' Equipment and Supplies Association (FTE&SA) founded in 1926. Originally, its main objective was to exercise control over, and, to rationalize, exhibitions of the products of member-firms. Over the years, and particularly during and after the 1939-45 war, the FTE&SA has been increasingly called upon to act collectively for members in negotiations with Government departments (*e.g.*, on such matters as core-oil supplies), in research and development (as in the design of efficient ventilation of stand grinders), in standardization matters (as in the standard specification of moulding box sizes), and in the improvement of working conditions in foundries (*vis-à-vis*, the Clean Air Act and the Iron & Steel Foundries Regulations).

Spheroidal-graphite-iron base (5 tons) of the centre-pivot for the radio telescope erected on Jodrell Bank for Manchester University. (Designers and consulting engineers: Husbands & Company; casting made by Davy & United Engineering Company, Limited.)

iron die-castings by the -b process at Qualcast, Derby, England. The is a multi-station rotary

year, the Association nized its own Foundry n at Bingley Hall, ham. Here, about 100 ere showing the most and versatile foundry nd equipment in the s well as novel develop- n foundry materials, sands, refractories, etc. hibited for the first time new ideas for auto- in foundries and in- le mechanical aids, from completely auto- elf-contained moulding emaking units down to ols and patternmakers'

nal Society of Master Patternmakers

d barely five years ago but already well ed, the National Society of Master akers (NSMP) draws its membership lependent concerns engaged in the trade tinct from patternmaking departments to foundry firms, though the latter are ly excluded from membership). Increas- ese master patternmakers' shops—where as 300 skilled craftsmen may be em- are called upon to furnish elaborate sets production pattern and corebox equipment oundry industry turns more and more to on. In this sort of activity, technical co- amongst members has already been in achieving a degree of standardization nized types of pattern equipment, and ons on many other matters have been . To date, the society has sponsored visits to patternshops, etc., in France and , and entertained a return visit from patternmakers; at present, the possibility r visits to see patternmaking establishments countries is being investigated.

British Bronze and Brass Ingot Manufacturers' Association

g the same secretariat as the Association ze & Brass Founders, and co-operating h that body, is the British Bronze & Brass nufacturers' Association (BBBIMA), com- early all the UK firms engaged in the on and sale of non-ferrous ingots to (In the UK it is common practice for majority of non-ferrous founders to pur- tified ingot material for remelting, rather make up their own alloys from virgin or tals.)

Sands, Coke and Scrap

For the sake of completeness, mention must be made of the services rendered to UK founders by the supply associations covering sands, coke, and scrap metal. These are, respectively, the Silica and Moulding Sands Association (secretary, Mr. G. K. Timperley, 30, Gordon Street, London, W.C.1); the Foundry Coke Merchants' Association (secretary, Mr. S. Owen, "Exchange," Birmingham), and the National Federation of Scrap Iron, Steel & Metal Merchants (secretary, Mr. L. H. Cryer, 33, Chancery Lane, London, W.C.2).

OTHER CONTRIBUTING ASSOCIATIONS

As must be expected with such a large and complex industrial structure as the UK foundry industry, a number of other Governmental and private organizations are in continuous contact and co-operation in certain directions. Space will not permit the detailing of the *modus operandi* of these many integrations with the foundry industry, but the following remarks may be regarded as illustrative of the "fringe" activities undertaken. For example, the collection of statistics for the UK foundry industry is undertaken variously—the Iron & Steel Board is responsible for those of ironfounding, the British Iron & Steel Federation for issuing those pertaining to steelfounding, the British Bureau of Non-Ferrous Metal Statistics for copper-base alloys and the Ministry of Supply for light-alloy foundry statistics.

On safe-working practices, safety devices and the legal aspects of working conditions generally, the Government Department concerned is the Ministry of Labour and National Service, acting usually through the Factory Inspectorate. Reference has already been made to the activities of the British Standards Institution—this work is at-ranged always as the result of joint consultation between makers and users of products, so that every British Standard in effect represents a form of basic contract between producers and their customers.

Educational

In educational matters, the foundry industry is served mainly by joint committees, the membership of which is drawn from the major employer associations within the foundry industry, acting together with the Institute of British Foundrymen and leading educational bodies. To serve the interests of craft apprentices within the industry, the National Foundry Craft Training Centre has been set up and is managed by the Council of Ironfoundry Associations. This system takes young men from foundries at intervals during their normal five-year apprenticeship period and gives them intensive general training of a month or so's duration at the Centre. The latter forms an annexe to a well-known Midlands iron foundry, with hostel accommodation provided nearby. For craft apprentices, the UK examining body is the City & Guilds of London Institute, which conducts examinations annually in foundry practice and patternmaking.

Some of the foundry industry's needs of highly-qualified technicians are supplied from students at the National Foundry College, situated at Wolverhampton. This was one of the first of such educational institutions to be set up after the 1939-45 war to serve the specialized needs of certain industries. The curriculum of the College is of two-years' duration, at the end of which successful students are granted Diplomas and become equivalent in status (in many respects) to university graduates. They form a nucleus from which senior executive positions within the industry can be filled.

At yet a third level, excellent educational facilities exist in the UK for the foundry industry in the country's vast network of high-grade technical colleges.

At university level, graduates in science, engineering, metallurgy, etc., are entering the UK foundry industry in increasing numbers. A gratifying feature of the present day is that higher education up to and including university training is available to all students possessing the necessary ability to make use of the facilities offered—irrespective of parental pecuniary status.

Technical Press

To complete this review of the UK foundry industry, it is necessary to make brief reference to the ubiquitous rôle of the UK foundry technical Press. Long-established and responsible journals, published weekly or monthly, continuously mirror the events and changes within the industry. Reports of developments in all spheres of foundry practice *are widely disseminated* and a forum is provided at which readers may apply for information from fellow foundrymen. Statistical, personal and trade information is collated and recorded, along with Patent information and descriptions of new plant, supplies and equipment, both in the UK and the foundry industry of the world.

ACKNOWLEDGMENTS

In according thanks for assistance in preparing this account, first, the writer wishes to acknowledge the help received from Mr. V. C. Faulkner, F.R.S.A., HON. M.I.B.F., Editor of the FOUNDRY TRADE JOURNAL, and his other colleagues. He thanks the firm's directors for permission to quote from copyright material and for enabling him to present the paper in Hungary in person. Next, grateful thanks are rendered to all the officials of the constituent organizations which make up the British foundry industry, who have rendered assistance in so many ways in the preparation and checking of the report. Due credit must be given to private firms for making illustrations available, and to the Institute of British Foundrymen, its Council and secretariat, for helping with the work. Lastly, the writer thanks his own staff for secretarial and other detail work so ably undertaken on his behalf.

If, as a result of publication of this paper, foundrymen in other countries find it easier than before to make contact with their "opposite numbers" in the UK foundry industry and easier also to address enquiries for technical or commercial help to the most fruitful quarters, then the Author will be well repaid for the effort involved.

British Railways' Express Services

All express services between Euston, Birmingham (New Street) and Wolverhampton (High Level) will be suspended, as from November 2, but an augmented service will be provided between Paddington, Birmingham (Snow Hill) and Wolverhampton (Low Level). Certain main-line express trains to and from Euston and the north will, however, stop additionally at Rugby to give connection with Coventry. This arrangement is said to be necessary to allow railway engineers to get on with the modernization and electrification work on the London Midland Region, which is to be speeded up. For the same reason, certain trains between Euston and Manchester (London Road) will be diverted to and from St. Pancras.

Foundry Plant. Incandescent Heat Company, Limited, Cornwall Road, Smethwick, Birmingham, have recently issued four brochures covering cupolas (FP.1); dust arrestors (FP.2); hot blast (FP.3) and ladles and receivers (FP.4). The catalogues are beautifully presented, and the reviewer especially admires the front cover of FP.2 as being an excellent example of colour printing. An interesting aspect of all the plant illustrated in this series of brochures is that none of it is as yet five years old. For those interested in all four sections of the melting plant dealt with, the collection has been assembled into one neatly-bound volume, which also carries an impressive list of customers.

VELCOME on the Mat" London-area Foundries

ent Features of Establishments to be
ected on IBF National Works Visits
, this year to be held on October 30

his tenth event of its type, the following works in the London area are to be visited by parties of the ute of British Foundrymen: British Bath Company, Limited; K. & L. Steelfounders & Engineers, ed; Ford Motor Company, Limited; Broom & Wade, Limited; Le Grand Western Foundries, Limited; ley Alloys, Limited, and G. D. Peters & Company, Limited. What follows constitutes a "pre-" of the visits, giving background information and "highlights" of the various foundry firms.*

British Bath Company, Limited†

chanized production of bath castings was comed at Greenford 32 years ago, and British Company, Limited, is now claimed to be the t cast-iron bath manufacturing company in pe. The firm have within the last 18 months leted the initial stages of a general works' anization, with the installation of a new auto- plant for the manufacture of cast-iron bath gs, giving an output in excess of one-per- e. This is in addition to the other mechanized ry units which have been maintained in full ction during major alterations to buildings, ations and construction of the extensive lations for the installation of the new plant. unit forms part of a fully-mechanized and ated sequence of moulding, casting, knock- nd sand treatment.

: latest addition to the melting department rises two lining-less hot-blast cupolas, with a recuperative installation to preheat the com- n air. The molten metal is distributed to the ng stations by electrically-operated overhead nded telpher ladles.

itors will have the opportunity of observing stages in the line production, dressing and cleaning, and batch weighing of materials for l-fired enamel melters. In the manufacture of r vitreous enamelling at the works, the molten el is tapped from furnaces at intervals into a quenching tank, producing the enamel in a l-like structure. After thoroughly drying, this ial is screened and gravity fed to a vibrating and thence into a number of continuous ills for final grinding, and, afterwards, sieving rading.

the process of vitreous enamelling which is d to baths, after the application of a ground- enamel has been thoroughly air-dried, the casting is loaded into the enamelling muffles and gradually heated to a controlled temperature. Next, the casting, at red heat, is removed by a travelling fork and placed in a universally rotatable fixture. Operators then sieve dry enamel-powder on to the internal surface of the bath casting, in successive operations, fusing the enamel evenly between each "dusting."

The finished baths, produced in white and a range of coloured enamels, are, after cooling, carefully inspected for surface finish. Protective paint is then sprayed on the outside, and each bath is fitted with a protective envelope before passing to the storage warehouse, prior to despatch by the company's road-transport fleet.

Cope moulding-box being separated from the drag part on the cooling conveyor in the mechanized plant of the British Bath Company, Limited.

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ther of the "host" foundries, *viz*: R. & A. Main, l, will be described in next week's JOURNAL.
lengthy description of these works was printed in the 1958, issue of FOUNDRY TRADE JOURNAL under the title Methods for *Bath Production at Greenford."*

General arrangement of the new-sand storage hopper and the new-sand mill at the Greenford bathmaking plant of British Bath Company.

The modern well-equipped patternshop, ceramic, metallurgical and sand laboratories, inspection organization, production planning and progress departments at British Bath, together with ancillary departments, all to be inspected by the visitors, will give a good idea of the comprehensive nature of this self-contained unit in a specialized industry.

K. & L. Steelfounders & Engineers, Limited

The works of K. & L. Steelfounders and Engineers, Limited, occupy over 70 acres of land at Letchworth, Hertfordshire. Letchworth was the first Garden City in this country and the early ideals in planning and housing have been almost entirely preserved, resulting in one of the most pleasant and well-balanced industrial towns in England. In these conditions, the company was first started in 1915, both as steelfounders and engineers, and was added to the 600 Group of Companies in 1928. Continuous progress and expansion since that date have resulted in one of the largest steelfoundries in the United Kingdom, integrated with a large modern engineering works. This latter is mostly devoted to the manufacture of diesel/mechanical mobile cranes, of which the works are the largest producers in Europe.

Over 90 per cent. of the large production of quality-controlled steel castings goes to supply the needs of those British engineering firms to whom high standards are important, and much of the output is supplied to the customer in the preliminary-machined or finished-machined state, ready for assembly into the final product. Nearly 10 per cent. of the output is absorbed in parts for Jones cranes.

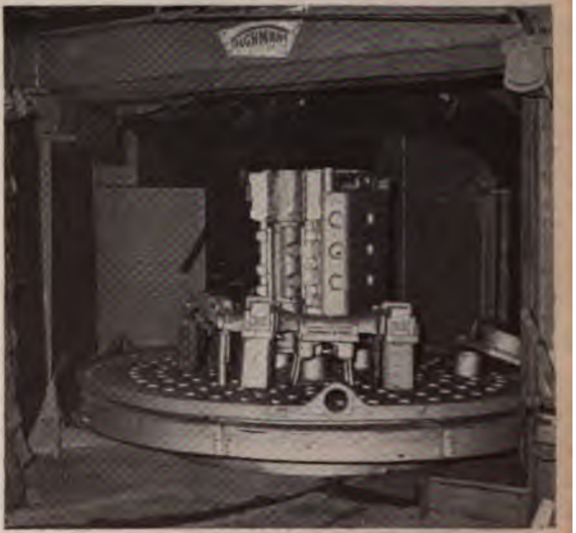
A wide range of carbon, manganese, low-alloy and high-alloy steel castings is produced, suitable for general purposes and for resistance to corrosion and heat. Long production-runs and medium-batch production of castings up to 2 tons each in weight is catered for; a special section being devoted to heavier castings.

Melting, and Pattern and Core Production

Steel is melted in three 5/7-ton top-charged basic electric furnaces and one 600-kw high-frequency unit. All raw materials used for melting are under the control of the metallurgical staff, working in well-equipped laboratories. Lamson pneumatic tubes connect the laboratories with the melting shops to provide samples for a rapid analysis of all the principal elements, so that the metallurgist in charge of the melting shops can have the final checks before tapping. In addition to the usual analytical, physical testing, metallographic, heat-treatment and sand-testing laboratories, there are departments devoted to non-destructive testing of castings by radiography, magnetic detection and acid pickling.

Prominent features of the up-to-date patternshop are the teak wood-block flooring, under-drawn roof and radiant panels (steamheated) in the ceiling and the west wall, and full-height glazing to the north and east walls. All woodworking

New Tablast cleaning machine with dual tables 9-ft. dia., recently installed at K. & L.



nes have dust-extraction systems running
ıeath the flooring to cyclone dust-arrestors
e the building. A metal-pattern section
s the main patternshop.
ge cores are hand made, and in addition a
nized coreshop produces 150,000 cores per
Coreblowing machines are in full use, to-
with other mechanical aids, and the cores
aced on a continuous-moving conveyor belt,
g into the drying ovens.

Moulding and Metal Distribution

main moulding shop is equipped with jolt/
er machines and larger jolters for handling
up to 10-ft. square. Smaller sections of the
ıre fully mechanized, having jolt-squeeze pin-
achines for producing copes and drags.
"heavy" steel melting-shop covers an area
,000 sq. ft. and houses two of the 5/7-ton
c-arc furnaces of the swivel-roof type, basic
Refining by oxygen injection is carried out
utine practice. A similar 5/7-ton furnace
the "light" foundry. All the furnaces are
ed by 3,500-kva transformers and have auto-
electrode operation by Amplidyne control
platinum-platinum/rhodium thermocouples
easuring temperatures. Also in the light
ry is a 600-kw high-frequency electric
e. This installation is powered by an alter-
set, provided with a 1,000-h.p. driving motor
perating direct from the high-tension supply
of 11,000 v. Here the furnace equipment
ises two 25-cwt. bodies and one 5-cwt. body.
three lectric-arc furnaces have a cycle time
hours for each melt. Tapping is effected by
lled tipping into ladles suspended from over-
cranes. The furnaces have a high angle of
p to 45 deg. by limit switch and up to 50
ıanually. Melting rate for the high-frequency
ces is such that a full
e of 25 cwt. can be melted
out 1 hour 20 min. After
g, the steel is taken to the
priate section by power-
transfer bogies, the ladle
transferred at the casting
to one of the overhead
, and the metal poured.
nsure good surface-finish
oundness, K. & L. are con-
y improving mould gating
ce and feeder-head tech-
s. They were one of the
ompanies to develop exo-
ic powders, a process
d to promote more
nt feeding.

Sand supply to the 9,000-lb. capacity shockless, jolt-rollover moulding machine at the Letchworth steelfoundry. The machine takes box-parts up to 10-ft. sq.

After-treatment

Normalizing, hardening and tempering of castings is carried out in a batch of six 170 to 240-kw Birlec electric heat-treatment furnaces. Annealing is also done in oil-fired temperature-controlled furnaces. Rotary-hearth furnaces also are used for the heat-treatment of small castings needing liquid quenching. K. & L. have additional plant for

*n of the continuous
'abrator plant at K. & L.
ounders and Engineers,
d, Letchworth. It has a
ghput of about six tons of
gs per hour.*

Battery of four (Monometer) molten-metal receivers in front of the two pairs of hot-blast furnaces in the Ford's Thames Foundry

surface hardening by oxy-acetylene flame and by high-frequency induction.

Coinciding with the urgent need for industrial development in north-west Essex was the firm's need to expand the facilities of their steel castings dressing-shops. Considerations indicated several advantages to siting such an extension at Halstead where there was a better chance to use the available labour force, and last year the company opened their Halstead branch. (Note: This will not be inspected by the visitors.—EDITOR.)

During the first year of operation at Halstead, 50 men have been absorbed and are engaged in the dressing of a weekly output of 60 tons of steel castings.

Recent additions to the Letchworth plant include: a 9,000-lb. capacity shockless, jolt-rollover machine capable of taking a 10-ft. square box; a continuous Wheelabrator shotblast plant handling a throughput of about 6 tons of castings an hour; a batch-type oil-fired mould-drying stove with a charging capacity of 20 tons; and a dual-table Tablast machine with tables each 9-ft. in dia.

Ford Motor Company, Limited

The all-day visit to the Ford Motor Company, Limited, at Dagenham will include a morning tour of the company's new Thames Foundry and a visit to the Dagenham Works in the afternoon. A comprehensive and detailed account of the new Thames
Foundry was given in the May 29, 1958, is
the JOURNAL. The new foundry was built
virgin 22-acre site close to the main work
was designed primarily to cater for the prod
of cylinder-head and cylinder-block casting
sizeable tractor components on a mass-prod
scale. The two buildings which constitute th
Thames Foundry cover an area nearly three
that of St. Paul's. The main building me
1,200 by 180 ft. and reaches as high as 70 ft.
building incorporates the main foundry oper
of melting, moulding, coremaking and fe
The ancillary building, which measures 700
by 70 ft., contains the sand-handling and d
casting, cooling, grinding and cleaning sectio

Melting and Moulding

Pig-iron and coke are brought in rail wag
the foundry and special consideration is giv
the handling of coke to keep breakages to a
mum, a telpher system being used to transfe
tainers from the wagons and convey the c
storage hoppers. These are placed adjacent
cupolas to avoid any excessive handling.
same telpher system is also used in the ha
of the limestone. Four 108-in. dia. hot-
water-cooled cupolas (two for each working
are installed for melting, and each cupola
8-ton receiver which delivers the molten
into ladles. These ladles are suspended on
rail-supported electric towing and hoisting

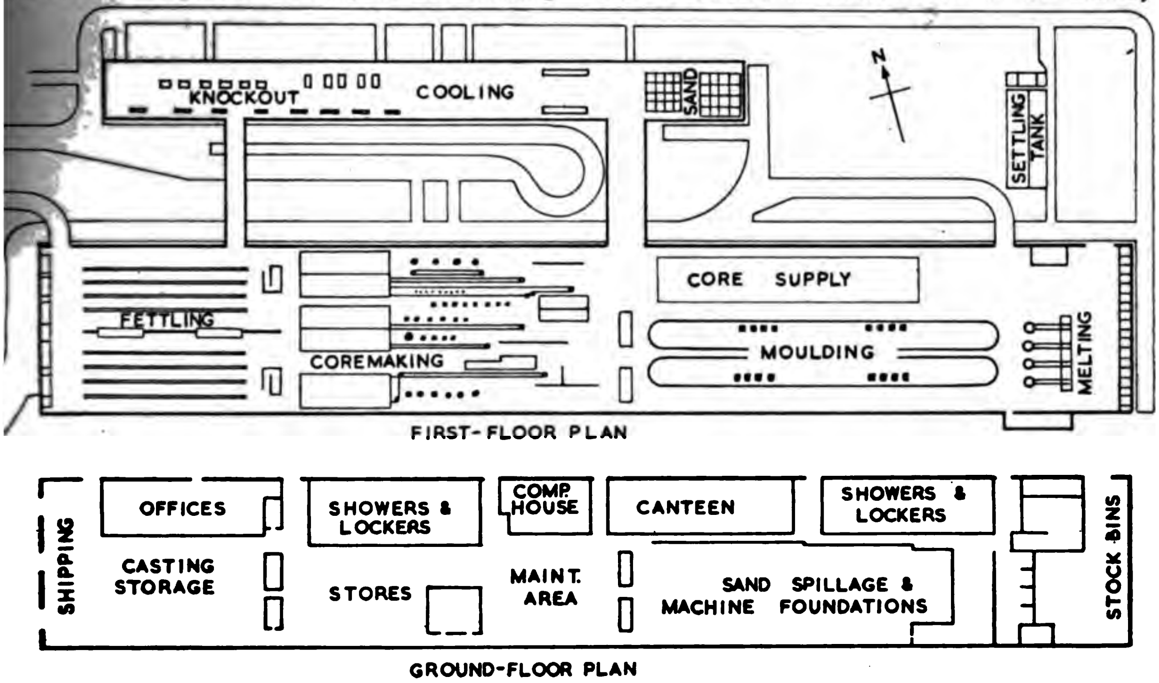
lso in this section, there is a 20-tons per hr. pacity pig-casting machine for taking any surplus etal. Passing on to the moulding section, here ere are two moulding production lines, fed om their own automatic sand systems, and these e equipped with fume- and smoke-collection pparatus. Eight semi-automatic moulding maches make up each line and these work in conjunc-on with an 800-ft. continuous mould conveyor the pallet type. Special hook carriers are used remove castings from the drag mould, and telpher bucket conveyor delivers the castings to e ancillary building where, after cooling, they ave the sand and cores removed by vibrators efore being taken to the grinding machines for ough fettling. The castings are then returned, by ay of two further monorail-type conveyors, to e main foundry for further cleaning operations, nd finally, to eight more fettling lines for finishing.

Amenities and Services

The main building of the Thames Foundry is a two-floor structure, the unusual feature being that melting, moulding, coremaking, etc., occupy the first floor while the lower floor contains the maintenance equipment, offices, stores and all employee amenities, such as locker rooms, toilets, showers and canteen. The canteen can accommodate 700 and hot meals are provided by the most up-to-date kitchen equipment. Each man is supplied with a heated twin-locker, one part for his working clothes and the other for his outdoor clothes.

The steam and gas mains and the power cables all follow the line of a common trestle-way to the new foundry from the company's powerhouse and coke-ovens—a distance of about half-a-mile. A road joining the main plant to the main Southend road is carried northward over a new railway bridge, and a new connecting road eastwards runs over the River Beam to the foundry. In addition to these new roads, nearly a mile of new railway sidings have been constructed for transporting raw materials.

The design and layout of the Thames Foundry is the result of an exhaustive study by Ford's engineers of all the principal foundries in America, Europe and Britain. This, coupled with the company's 30 years' experience of foundry operations, has resulted in a modern "work-flow" foundry, incorporating the maximum degree of mechanization, automation and semi-automation wherever the processes have permitted, thus reducing human effort to the minimum compatible with maximum production output.



FIRST-FLOOR PLAN

GROUND-FLOOR PLAN

Ground and first-floor plans of Ford Motors' Thames Foundry, near Dagenham.

Other Departments

The coreshop is located in the main building. The core sand is mixed at a central high-level station and this operation is completely automatic and actuated by a punch-card system. The mixed sand is conveyed by two pneumatic systems to the coremaking machines. All the cores are made by 39 semi-automatic vertical-type coreblowers. Cores are taken by conveyor for drying to five continuous horizontal ovens, these being built at an elevated level to facilitate operations and also to provide storage space beneath. After leaving the ovens, a core-wash is applied to cores and this is then dried in one of three horizontal drying ovens. Nine core-grinder machines are installed to grind off surplus sand where required.

A party of visitors watch the pouring of medium-size moulds in the Broom & Wade foundry at High Wycombe.

The "Broomwade" Foundry

Some engineers are of the opinion that this century may become known as "The Age of Compressed Air," believing that without it industry could not have achieved the phenomenal progress of recent years. Among the companies who have pioneered in this development, and followed the progress of the new industry is Broom & Wade, Limited, who produce a large range of compressed-air equipment in large factories and foundries at High Wycombe, Buckinghamshire. It is in the foundry, under close control, that the raw materials of the craft become transmuted into the utilitarian shapes called for in the production of this large range of compressors and air-using equipment. In this modern, up-to-date mechanized foundry, high quality castings of up to approximately 2 tons weight are produced at a rate of about 2,500 tons per annum, in high-duty, low-phosphorus cast-iron, to grades 14 and 17. Here, too, Broom & Wade "take their own medicine," as it were, in the extensive use of compressed air for foundry applications.

Processes and Equipment

The sand plant is situated on an elevated platform at the far end of the foundry. It consists of a battery of August Simpson No. 2 mixers, in which the sand is treated prior to being conveyed by overhead belting to the hoppers over the moulding stations. The core sand is also prepared here, in a Fordath mixer. The majority of the cores for the larger castings are hand made in a separate section on the foundry floor, although some are blown on a Demmler machine.

The coreshop producing cores for the smaller castings is situated adjacent to the main foundry. Here extensive use is made of mechanical handling equipment to ensure a regular flow to the mechanized moulding plant. Thirty-five core-making stations are served with their raw material by overhead hoppers. "Green" cores are carried by a pendulum conveyor to two coke-fired Acme continuous stoves, from which they are passed on by the conveyor to the finishing and spraying section. Here, both the spray cabinets and guns used are of B.E.N., Limited manufacture (an associate company of Broom & Wade, Limited). After a final infra-red stoving, the cores are passed on to the core stores, from where they are fed as required to the foundry.

Moulds for the majority of the castings (up to 112 lb.) are produced on two Coleman Wallwork type CN 700-lb. jolt/squeeze/turnover machines, the moulds being cast both in green-sand, and after hardening by the CO_2 Process. A roller track carries completed moulds to a Coleman Wallwork pallet-type continuous conveyor, on which they are poured from a ladle of metal carried by overhead crane from the melting furnaces—two 30-in. and one 36-in. cupolas. A compressed-air cylinder is employed to push cast-up moulds off the conveyor to the knock-out station, from underneath which the used sand is returned in the normal way by belt conveyor to the sand reconditioning plant.

Larger castings are produced from machine-made moulds subsequently stove-dried or hardened by the CO_2 Process. A "synthetic" sand is used for both green-sand and dry-sand moulds, and also as backing sand for the CO_2 moulds. One of the four overhead cranes serving the large area of the foundry floor is used almost exclusively to convey the metal from the cupolas to the pouring stations for the larger castings. Moulds from this section also are knocked out on a floor-grid and from here, too, the used sand is returned by belt conveyor to the sand-reconditioning and mixing plant.

As might be expected, extensive use is made of "Broomwade" compressed-air tools in the fettling department, as well as the foundry. The cleaning section is suitably located to handle castings both from the mechanized plant and from the section producing the larger items. Other finishing equipment includes a shotblast cabinet and a small rotary blasting unit.

Throughout the whole of the foundry such processing procedures have been adopted as will

f the laboratories at Langley Alloys, Limited. In the foreground are machines for the physical testing of sample bars for tensile and compression strength, Izod impact, etc.

e maintenance of a high degree of quality Metal samples from each melt are tested orks laboratory and rigid surveillance is over both moulding and core sands.

Langley Alloys, Limited

Alloys, Limited, Slough, was founded ate company in 1939, with the object of special copper alloys. To-day, it is that many of the original alloys are gular production and remain unsurpassed plications for which they were designed. he war, the range of alloys made was to include certain nickel alloys and, in the years, the production of these rose sharply ddition, the manufacture of austenitic teels was undertaken. Langley Alloys a specialist service to industry, in co- the development, production and appli- alloys in both cast and wrought forms. ce provides the essential link between the s laboratories and industry, so that the ssible use can be made of materials available, and research can be expressly owards the development of new materials by the increasing progress of modern

nd- and Shell-moulding Foundries

d foundry at Slough is equipped to pro- both hand and machine moulding—a wide variety of ferrous and non-ferrous castings up to a weight of 27 cwt. A speciality is made of pump casings, impellers and valve bodies in aluminium-bronze, gunmetal and stainless-steel, and many castings are provided for the electrical industries in high-conductivity copper. The Langalloy nickel-base alloys and stainless-steels are employed for duties necessitating high resistance to corrosion or for ensuring high purity and freedom from contamination, and have gained wide acceptance in industries where high quality is demanded, including transparent-paper manufacture and nuclear power. Castings are also produced in Monel, Nickel and Inconel. The shell-moulding foundry produces castings in a similarly wide range of alloys, for applications calling for a high degree of accuracy and surface finish.

Valve Manufacture

Castings for the firm's valves, which are supplied to the chemical and petrochemical industries in many types, alloys and a wide range of sizes, are produced in both the sand- and shell-moulding foundries. For these services, it is required to produce castings to withstand pressures up to 1,800 lb. per sq. in. These castings are machined and assembled in a large-scale modern machine-shop. Many of the alloys are supplied in the forms of bar, stampings and forgings for a broad range of applications, including gas-turbine, motor and marine engineering.

One of the Langley Alloys' inspectors dimensionally checking the bottom half of a pump casing made in gunmetal and weighing 22 cwt. as-fettled.

The manufacturing facilities at Langley are backed by a wealth of production experience and the company is continually developing new techniques and works processes. The firm's technical service gives authoritative advice on matters concerning design and selection of materials, and their development engineers are in touch with the latest advances in various branches of the industry—a valuable exchange of information on materials and requirements is provided.

Le Grand Western Foundries, Limited

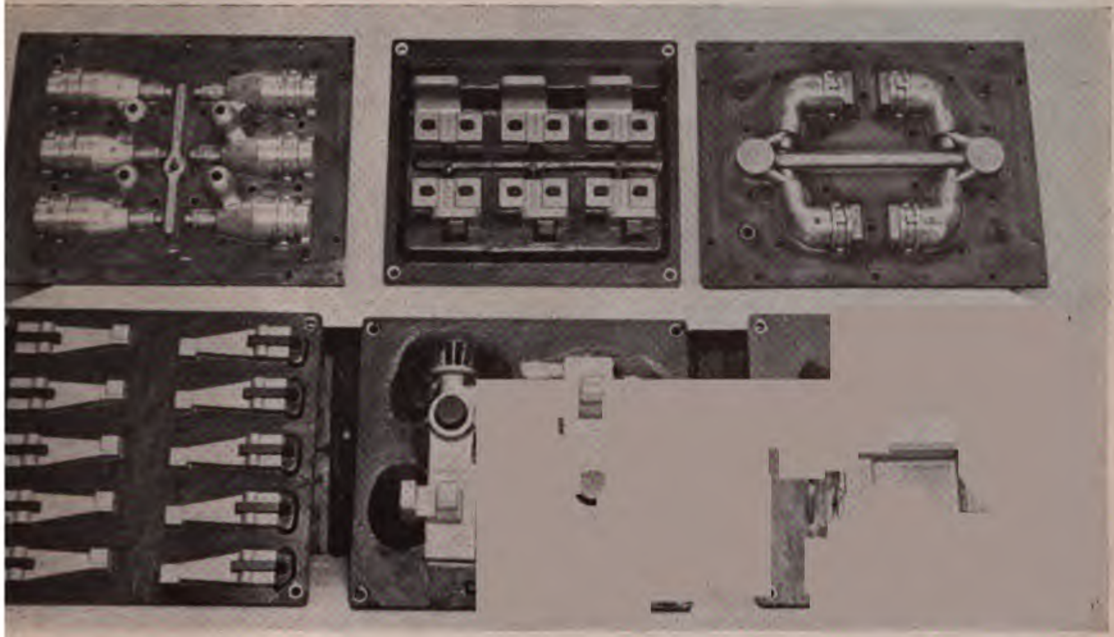
Founding at the premises of Le Grand Western Foundries, Limited, Southall, has been practised since 1875 and thus has quite a long history. In the course of its evolution, the establishment has developed from a small backyard foundry in what was a stable in an orchard to the present buildings which are designed on orthodox flow-production lines, suitable for any form of manufacturing. The present foundry is housed in what was originally a machine shop, as, when it was decided to house machining facilities in another locality, the foundry management were offered the premises previously used for that purpose with a view to conversion to a more modern foundry than existed at that time.

The work dealt with includes a variety of engineering jobbing castings, ranging in weight from a few ounces to 8½ tons in iron, up to 15 cwt. in aluminium, and up to 26 cwt. in bronze. All the facilities of a self-contained unit are available, *i.e.*, patternshop and laboratory.

Special Features

The foundry now has dispensed with all its stoving facilities for moulds, as a result of the adoption of the CO_2 Process for all large-size floor work, heavy castings and box work. Combinations of green-sand and CO_2 practice are regular features of the day-to-day production, using on occasions quite youthful labour for sizeable and important castings. Water blasting has recently been incorporated as part of the general installation, together with sand reclamation and the recirculation of water

BMD plant at Le Grand Western Foundries, Limited, Southall, for cleaning castings by high-pressure water jet; (left) view inside the blasting chamber, and (right) operating the "gun" from outside the chamber. Settling tanks make possible sand-reclamation and re-use of water.



:al small patterns produced and used by G. D. Peters & Company, Limited, Slough. Top left ight are patternplates for shell moulding, and the remainder are all aluminium matchplate patterns for small machine-moulding production.*

the settlement pits. The old part of the firm l kept in operation, mainly for the production n-ferrous castings. Here again, it should be l that one type of furnace of a proprietary is in operation quite successfully for melting us kinds of metal. Comparison between the oundry and the new with regard to facilities, will provide additional interest for the visitors, ill consideration of the methods of laying f sizeable jobs before commencing pattern and ox construction specially adapted for applying hardening practice. Particular attention is to the assembly of block-core or mould parts e virtual elimination of box-parts in some nces, except for safety purposes.

G. D. Peters & Company, Limited

D. Peters & Company, Limited, as it is known y, is the parent company of the G. D. Peters p, and was founded in 1869 by Gordon ldson Peters, at Moorgate Works, Moorfields, e City of London. At that time, the company ted in a very modest way, manufacturing rail- seating and blinds and carriage springs. When). Peters made an association with W. Pope ns of Gotha Works, Slough (also railway con- rs), the joint venture started to expand, and 392, in addition to the original products, were ucing gas-lighting and heating equipment for ges. They also manufactured air-compressors vacuum brakes.

the year 1897, further expansion took place two more companies were drawn into the

Side frame, weight 7 cwt., typical of the medium-size iron castings produced at G. D. Peters.

Section of the iron castings fettling shop at G. D. Peters, with part of the continuous shotblasting plant in the background. Note the use of pneumatic hoists for transferring castings from and to the roller conveyor.

association, these were the Patent Deep Stamping Company of Bermondsey and the Coil Clutch & Pulley Company of Bristol, which operated under the title of the Consolidated Engineering Company, Limited. The new association proceeded to further expand and extend the brake business and also continuously undertook the manufacture of new products. In the year 1905, G. D. Peters & Company moved to Slough, and acquired the Consolidated Engineering Company, which was renamed the Consolidated Brake & Engineering Company, Limited, to function as a sales organization for the products of the companies. In the year 1909, G. D. Peters & Company became a private limited-liability company, and in 1916, was made a public limited-liability company.

The Peters Group now comprises: G. D. Peters & Company, Limited; the Consolidated Brake and Engineering Company, Limited; Packaging Machinery (Peters), Limited; the British Air Brake Company, Limited; Timbrell & Wright (Successors), Limited; Hancock & Company, Limited (oxygen-gas cutters); Weldcraft, Limited (everything for gas and electric welding), and the Consolidated Brake & Engineering Company (South Africa) Pty. Limited. There is now hardly a country in the world where Peters products are not extensively used on either road or rail transport, or both. Recent further development has resulted in expansion in various departments, particularly in the foundry and patternshop.

Foundry

The old general foundry has been completely redesigned and reconstructed to meet increased demands and now houses very modern plant *capable of* a weekly output of 150 tons of ferrous *castings. About 60 per* cent. of the output is used by the group itself, the remaining 40 per cent. being available for sale. The foundry is housed in a main building 180 ft. long by 120 ft. wide, comprising three bays each of 40-ft. span; this building contains all the ferrous and non-ferrous moulding plant and equipment.

For the provision of iron melting, there are two No. 3½ Jackman cupolas working alternately, and having a daily output of 30 tons; metal is normally produced to B.S.1450/17. Two smaller gas-fired furnaces supply the non-ferrous section with 600-lb. of gunmetal per day.

On the machine-moulding section, close control is possible of the amount of old and new sand, bentonite and water required. Sand is mixed in a 30-ton per hr. continuous sand-mill, and tests are carried out for moisture content, permeability and green-strength, etc., in the laboratory testing booth. Sand for the heavy hand-moulding and light machine-moulding sections in the east bay is supplied from two smaller sand-mills with an output of 4 tons per hour each. This is delivered along the section by an overhead conveyor. Moulds from the mechanized plant are produced on two self-contained tracks, catering for either medium- or heavy-type moulding boxes. The medium-mould section is served by two jolt/rollover machines and two No. 4½ jolt/lift moulding machines. Moulds from the heavy section are produced on two jolt/rollover machines of larger capacity and two No. 4½ jolt/lift moulding machines. In the heavy hand-moulding bay castings of various sizes are produced, typical box-part sizes being 6 by 2 by 2 ft. or 6 ft. dia. by 8 in. deep. Light castings (*i.e.*, up to 30 lb.) are produced on two jolt/squeeze moulding machines in the east bay.

Core and Cleaning Departments

The core department is capable of producing any size of core required, either in oil sand or by the CO_2 Process. Small cores are made on the core-shooting machines available in this department, and dried in a continuous gas-fired oven. Where numbers are small, cores are made by hand. Large-size cores are made on the foundry floor, and then dried in a large batch-type oven. The sand is mixed in four sand-mills, giving a total output of 3½ tons per hour. For handling, overhead cranes

e, their capacities being one 2-ton, one
one 1-ton.

castings, the following equipment is
-(a) Overhead conveyor-type Wheela-
for continuous shotblasting of medium-
; (b) W.T.B.2A Wheelabrator Tumblast
ıle of handling 3 tons per hour of small
1 (c) 9-ft. by 6-ft. by 8-ft. high shotblast
ıavy castings (sizes up to 6 ft. by 5 ft.
.fter shotblasting, castings are passed on
ling machines and fettling benches for
nd after careful inspection are delivered
;, where a paint-spray booth is installed
ıg " castings if required. A large area
under cover for the storage of castings.
n patternshop at the east end of the
ures that patterns of high accuracy and
ssued to the foundry. Full-time inspec-
ed out on all patterns of wood, metal
uld equipment, and there is almost no
size of pattern that can be produced.
s of the Peters Group are also well
ɔy the availability of the firm's extensive
ıps, providing the customer, if he should
, the advantage of having his products
tely machined to close tolerances and
cation.

(Wolverhampton) Anniversary

Sons, Limited, Wolverhampton, celebrated,
14, the company's 50th anniversay in the
Road factory to which it moved in 1909
ı. During the evening the Hon. G. C. H.
rman of the company, presented long-
ds to employees, and in his address he
ticularly to the presence at the jubilee
of his father, Lord Hayter, who is 87.
ıur film, produced by Mr. Leslie Tinklet,
nd this depicted the activities of the Chubb
n the UK, Canada, Australia and South

ening of October 13, the company enter-
ty of international bankers, and for their
strongroom doors, being made by the
the head office of the Bank of Montreal,
ʀed. The doors, made of stainless-steel
bronze, are 42-in. thick and incorporate
locks as well as a time lock and automatic
vices.
any was founded at Portsea, Portsmouth,
Mr. Charles Chubb, and entered the lock
business through his brother, Jeremiah,
ınted a special patent for a locking device
in use to-day. About 1820 the company
a lock-making plant in Wolverhampton,
built a factory in Railway Street, where
.cture was carried out until the lock side
ıess was joined with the safe factory in
Road in 1938.

ɴᴇ of a diesel rail unit was among the
isplayed in Derby Cathedral at the annual
ndustry on October 11. The service, des-
"harvest of factories," was attended by
es of workmen and management of dozens
ıctories. Machinery was displayed in the
exhibits included clocks and pieces of
paratus.

Law Cases

Faulty Barrow Legs Cause Accident

A barrow, the legs of which were stated to be the wrong way round, featured in a Middlesbrough County Court case brought by Mr. Frederick William Stirling (36) against Dorman, Long & Company, Limited. Mr. Stirling, a charger at the firm's Acklam Works, alleged negligence against the company. He was awarded £73 damages.

The plaintiff said that he was carrying iron ore in the barrow—classified as 35-X—to the bell of a blast furnace for tipping when, as he dropped the barrow in the normal way, its right leg damaged his foot. He explained that the barrow legs in this particular case protruded 3 to 4 in. more than was normal. Workmates told him that they had been put on the wrong way round. As a result of his accident his foot was bruised and he was off work 18 days.

For the defence, Mr. K. Appleton, a chargehand boilersmith, said he kept a record of the barrows and saw the barrow which caused the accident. The defect had never occurred with any other barrow and it was unique.

Giving judgment, Judge Clifford Cohen said he was more prepared to accept the word of an eye-witness than what was contained as an entry in a book.

Widow's Action Succeeds

In the High Court before Mr. Justice Lloyd-Jacob, a Crawley (Sussex) widow, Mrs. Albertha Taylor, and her 11-year-old daughter, were awarded £4,000 agreed damages against the Morgan Crucible Company, Limited, London, S.W.11. The action arose out of the death of Mr. Edward Taylor (41), a furnaceman employed by A.P.V.-Paramount, Limited, Crawley, when a furnace fell on him in November, 1955. A.P.V.-Paramount was also sued and was given judgment without costs against the Morgan Crucible Company.

For the plaintiff, Mr. John Thompson, QC, said that part of the furnace was made of cast iron, which fractured at the bolt holes allowing the furnace to fall. Criticism had been made of the use of this material.

Mr. Fenton Atkinson, QC, for the Morgan Crucible Company, said the part was cast by highly reputable people and as far as the use of cast iron was concerned large numbers of furnaces of similar design had been sold without similar trouble. The one in question had been in use for three and a half years.

Crane Ganger awarded Damages

An accident in which a Rowley Regis (Staffs) man lost his left eye must have been an extremely painful one, said Mr. Justice Pilcher at Birmingham Assizes, awarding Mr. Frederick Ronald Carpenter £2,400 damages. Mr. Carpenter brought an action against his employers, Accles & Pollock, Limited, makers of seamless steel tubes, etc., of Oldbury (Staffs). The company admitted liability and the only matter for the court was to assess the amount of damages.

Mr. A. E. James said that in February, 1958, Mr. Carpenter was working as a crane ganger. Part of a steel load fell from the crane sling on to him causing serious injury to his eye and face.

Giving judgment, Mr. Justice Pilcher commented that Mr. Carpenter was still employed by Accles & Pollock, with whom he had been for 25 years. He was now earning about 25s. a week less than his wage as a crane ganger.

Mond Nickel Exhibition

The Mond Nickel Company, Limited, is staging an exhibition at Marlands Hall, Southampton, from October 27 to 30. It will be opened on October 26 by Rear-Admiral W. F. B. Lane, D.S.C., M.I.MECH.E., Director of Marine Engineering, Admiralty, and many guests from the foundry and ancillary industries and the metallurgical world are expected to attend the opening ceremony. Over 12,000 designers and technicians have been invited to visit the Exhibition, which features the properties of nickel, nickel-containing materials and the platinum metals, and to discuss the latest developments in the nickel industry with members of the company's development and research department. The Exhibition will be divided into sections dealing with: mechanical and physical properties; corrosion-resistance; electrodeposition; strength at high temperatures; toughness at sub-zero temperatures, and welding, and will include working demonstrations, illustrations and specimens of materials. Each day a number of films will be shown relating to particular aspects of the Exhibition.

Improved Gunmetal

An improved gunmetal will be displayed, and its properties illustrated in a series of graphs. The new alloy, 85/6.5/3/3.5/2 Cu/Sn/Zn/Pb/Ni, has much better mechanical properties at both atmospheric and elevated temperatures than 85/5/5/5 gunmetal, and yet still retains the same adaptability to the production of pressure-tight castings. It is claimed that properly made castings in this alloy have a 0.1-per cent. proof stress of around 8 tons per sq. in., with a maximum stress of 16 to 17 tons per sq. in. in sections up to 3 in. thick. The mechanical properties can now be related to those obtained from separately-cast test-bars.

Other Prominent Features

The marine application of nickel will be prominently featured. In 1942, the Admiralty adopted nickel/aluminium-bronze propellers as standard equipment for M.T.B.'s and, in August of this year, a propeller with a cast weight of about 50 tons was produced at the works of Lips N.V., Drunen, Holland. This giant will be the only propeller fitted to the Tidewater Oil Company's new 72,600-ton super-tanker being built at Dunkirk by Ateliers et Chantiers de France. Another interesting display will be a specially designed working model of the first automatic rhodium-plating plant ever built. The plant has a capacity of 240 items per hour and, handling eight pieces at a time, completes the plating operation in two minutes. Rhodium is one of the platinum group of metals, and is bright and untarnishable, with a high reflectivity. The Inco-Mond organization refines this metal, and is responsible for the production of nearly half the Western world's platinum metals.

Electrical Engineering Course

The first of a course of six lectures on "Electricity Supply Regulations and Electricity Regulations made under the Factories Acts," was held at the Manchester College of Science and Technology, Manchester, 1, yesterday evening, the other five lectures will be held on successive Wednesday evenings commencing at 7 p.m. The fee for the course is £1 5s. 0d. and applications, which should be made to the registrar of the College, will be dealt with in the order in which they *are received.*

"Education and Engineering"

The Herefordshire and South Worcestershire committee of the Engineering and Allied Employers' West of England Association recently held a conference at Malvern when the subject of discussion was "Education and the Engineering Industry."

There was a lively interchange of opinions, Mr. F. A. Fielding, managing director of Heenan & Froude, Limited, Worcester, and chairman of the Association, saying that he thought that unless teaching in schools was directed on the right lines, neither industry nor technical colleges could give students the qualifications required to rise to high executive posts. A Worcester headmaster, on the other hand, was of the opinion that the real weakness was in industry. "You tend to expect from us the finished article instead of what I think you call a 'malleable casting'," he said.

Mr. Fielding said that perhaps industry in the past had been at fault in accepting too many youths of mediocre standard, and that the schools should do more than arrange an occasional visit to a neighbouring works. He added that he would like to see small groups of headmasters and careers masters spending a whole day in companies in the area.

Other speakers were Mr. D. D. Lindsay, headmaster of Malvern College, who did not think that it was part of his duty as a headmaster to recruit for any particular industry or trade; and Mr. A. A. Part, Under-Secretary for Further Education, who was for a good general education in the schools, as there was plenty of time for specializing later.

Finally Mr. Phillips, personnel director of Heenan & Froude, said that there were still many firms which held the idea that the only training needed in engineering was a straightforward five-year apprenticeship on the shop floor. For higher level posts such firms recruited, or to put it more bluntly "poached" qualified engineers from other firms. "It behoves us who want good men to train them ourselves," he said.

RoSPA Campaign for Safer Lifting

A nation-wide campaign to prevent injuries caused by the application of incorrect personal lifting methods to goods and materials in industry has been organized by the industrial safety division of the Royal Society for the Prevention of Accidents (RoSPA) to commence on November 23. The campaign has been prompted by the concern expressed by industrial safety-officers about the apparent increase in the incidence of injuries from this cause, and its objective is to make people in industry more fully aware of the dangers of incorrect lifting or handling of goods and to make known the correct method.

The system advocated by the campaign is that of "kinetic handling," the principles of which have for several years been put forward by Mr. T. McClurg Anderson, director of the Institute of Human Kinetics, and the Central Council of Physical Recreation. This system requires the planning of the movement or lifting of an article as a series of co-ordinated operations designed to take the carrier of the object from his starting point to his finishing point with the minimum of bodily effort; for this reason the campaign slogan "Correct Handling eases Effort" has been selected. A whimsical character—Mr. Featherwate—has been created by the Society for this year's campaign and he will appear on all posters, leaflets, booklets, etc. Inquiries should be addressed to the Society, at 75, Victoria Street, London, S.W.1.

tes from the Branches

Australia (*Victoria*)

ear, the Australia (Victoria) branch of the
of British Foundrymen celebrates the 21st
ry of its foundation as an organization cater-
e technical needs of foundrymen, and accord-
seventh annual convention of the branch,
ld in Melbourne from November 16 to 20,
rather special event. Notable people in the
industry, both in Australia and from overseas,
lecturing and the programme also includes
ents, works visits and trips to national under-
uch as the Upper Yarra Dam.

ing the opening of the convention at the John
emorial Hall, Royal Melbourne Technical
at 3 p.m. on November 16, the branch will
annual meeting and hear the presidential
There will be a fellowship tea at 6 p.m. In
ing, commencing at 8 p.m., Mr. E. Longden,
.E., a past-president of the Institute, will
e first Tom Makemson Memorial lecture, "A
of the Highlights in the Experience of a
man over the Past 50 years." The next day
levoted to the visit to the Upper Yarra Dam
ghtseeing tour, followed in the evening by a
arty.

Wednesday, technical sessions will be held
etallurgy School, Royal Melbourne Technical
when the following overseas-sponsored papers
presented:—"Manufacture of Automobile
liners," by G. F. Alexander (South Africa)
reen-sand Principles Controlling Casting
by E. H. King, J. S. Schumaker, and R. W.
merican Foundrymen's Society). The pro-
is made up with a paper from New Zealand
disclosed) and one entitled "Gases in Metals
oundry," by J. Prentice and R. Moore (New
ales division of the Australian branch).

t to the foundry of General Motors-Holden,
is scheduled for the Thursday morning and
n, the evening technical session comprising a
Mr. E. Longden entitled "Influence of Mould
ns on the Soundness of Castings." Another
time to the works of Caterpillar of Australia
nited, Broadmeadows, has been arranged for
y morning; delegates will have time to them-
the afternoon, and the convention concludes
annual banquet at Union House, University
urne.

Lancashire

ssion's first meeting of the Lancashire branch
d at the Midland Hotel, Manchester, at
on Saturday, October 10, when a good
e of members were present to hear the new
resident, Mr. C. M. G. Wallwork, deliver his
ial address. In this he outlined his views on
nt closing of a number of foundries, and
ured to forecast future trends within the
(*Inter alia*, he mentioned that it had been
to install a bar in the meeting room for
our prior to each meeting, and for the same
fter closure, in the expectation that this would
mbers to get together in a social atmosphere,
uss their problems!)

en introduced the lecturer, Mr. L. W. Bolton
r of the Morris Motors Engines Foundry,
orough), who presented a paper entitled
tion of an Automobile Cylinder-head Casting
Iron." Mr. Bolton described in detail the
quipment, making of cores and moulds, and
l metal control methods, stressing the fact that,
as the castings were machined on fully-automatic machines the limits of accuracy required were extremely fine.

A vote of thanks to Mr. Bolton was ably proposed by Mr. R. L. Handley, and seconded by Mr. N. Cook.

Discussion

In the discussion which followed, a member asked if plastic patterns had been tried for this type of work, and what were the snags in making shell cores. Mr. Bolton replied that plastic patterns had been used successfully, although obviously they could not be heated. As to shell cores, in making these there was a possible danger of metal penetration and there was also difficulty in getting uniform sand, since the cores were made from pre-coated sand which, unfortunately, in his experience varied from batch to batch. To another member who wanted to know if the coal gas used for vent testing was ignited, Mr. Bolton replied in the affirmative. He said that the wires running through the stools in the coreboxes formed the vents, wax vents were not practicable.

Asked: (*a*) if the metal composition of the core "carriers" was identical with that of the coreboxes and, (*b*) why it was necessary to cast the combustion chamber on top Mr. Bolton explained that the same aluminium alloy was used for coreboxes and "carriers," and the combustion chamber was cast in that way so that all the cores could be assembled on the "slab" core. If the chamber had been in the bottom, core-assembly would have to be done in the moulds. The corebaking oven temperature was around 500 deg. F.

Details of the cleaning process were then asked for and in dealing with this Mr. Bolton said that "jackets" were hard to clean; for those parts which could not be reached by shotblasting it was advantageous to immerse them in a molten alkali, caustic soda had been used for this purpose, and water was used to test volumetrically if the jackets were clean.

The next questioner referred back to the variability of the sand and asked Mr. Bolton if he used oil- or cereal-bonded sand. He received the reply that the sand used was based on that from the knock-out. The ideal sand for jacket cores was Southport sand, and for moulds Congleton sand was used with additions of local "open" sand to confer permeability, and here a resin bond was used. For the jacket core, the sand bonding material would be linseed oil and dextrin.

Another speaker asked about the accuracy of the combustion chambers. He said he had been surprised at the variations which had occurred in cylinder-heads he had made himself, and he now thought that combustion chambers contour-machined from the solid were best. Mr. Bolton, however, said that he did not think that cylinder-heads could be produced in this way at a price customers would be prepared to pay.

This concluded the discussion, and on behalf of members, Mr. Wallwork again thanked Mr. Bolton for his excellent lecture. The meeting was followed by a dinner and theatre-party arranged for members and their ladies.

A SPATE OF ORDERS for a new type of pencil-sharpener has caused the Dudley penmaking firm of Joseph Gillott & Sons, Limited, to introduce shift working for the first time since the company was founded nearly 140 years ago. "A new four-hours' evening shift, from 5.30 to 9.30, mainly of housewives who are busy with their homes and families during the day, has enabled us to increase output of the new produce by one-third," said Mr. Nicholas Gillott, managing director of the firm and great-great-grandson of the founder.

Personal

Mr. A. Kirkham has resigned from the board of directors of Sir W. H. Bailey & Company, Limited (Albion Works, Patricroft, Manchester) and joined the foundries division of David Brown (Industries), Limited, Penistone.

At the General Election on October 8, Mr. John H. Osborn, a director of Samuel Osborn & Company, Limited, steelfounders, etc., of Sheffield, was elected Member of Parliament (Conservative and Liberal) for the Hallam Division of Sheffield.

Mr. D. F. Beynon, labour manager, F. H. Lloyd & Company, Limited, has undertaken to open a one-day conference on "Managing an Apprentice Association," sponsored by the Industrial Welfare Society and to be held on October 28 in Birmingham.

Mr. G. V. Wynne-Jones has relinquished his position of sales manager of Guest Keen & Nettlefolds (South Wales), Limited, in order to devote his time to his own business interests. He has been the company's sales manager since 1955.

Dr. J. W. MacFarlane, managing director of the MacFarlane Engineering Company, Limited, Glasgow, has left for a business trip that will take in Australia, Tasmania, the USA and Western Canada. As vice-convener of Renfrew County Council, he carries greetings to the County of Renfrew in the province of Ontario. He takes with him a replica of the Renfrew County coat-of-arms and an illuminated address from the Lord Lieutenant of Renfrew.

Dr. D. F. Galloway, director of the Production Engineering Research Association, at Melton Mowbray, returned to the UK on October 13 after a visit to Zürich where he was the first Englishman to be elected world president of the International Institute of Production Engineering Research. Earlier he had undertaken a tour of Russia as head of a three-man mission the findings of which are to be collated in a report to be published at the end of this year.

Armstrong Whitworth (Metal Industries), Limited, announce the appointment of Mr. Ian Robinson, as technical representative for the Sheffield area. Mr. Robinson (aged 34), studied engineering at the Keighley Technical College, and subsequently served with Handley Page, Limited, and Armstrongs Patents, Limited, York. Prior to joining Armstrong Whitworth's in mid-August this year he was employed in York by a firm selling building and engineering plant.

The fifth Elbourne Memorial Lecture at the Royal Commonwealth Society on October 30 is to be given by Mr. Harold Wilmot, vice-president of the British Institute of Management. Mr. Wilmot is chairman and managing director of the Manchester locomotive engineers, steel, brass, and ironfounders, Beyer, Peacock & Company, Limited, and its subsidiaries and chairman of a number of other companies. The lecture has been given each year since 1955 on subjects of special interest to management.

Mr. Stanley Smith, managing director of Fellows Bros., Limited, ironfounders, etc., of Cradley Heath (Staffs), and Stringer & Son (Cradley Heath), Limited, ironfounders, of Cradley Heath, and a director of a number of companies of the John Folkes (Lye Forge), Limited, group, Stourbridge (Worcs), has retired. After studying metallurgy at Smethwick Technical College, he gained experience as a metallurgical chemist with a public analyst in Birmingham. Before joining the John Folkes group, Mr. Smith, who is 40, gained further experience with the General Electric Company, Lim[illegible] and Guest, Keen & Nettlefolds, Limited, Birmingham.

The following appointments are announced [illegible] Ferranti, Limited, electrical and general engineer[illegible] of Hollinwood (Lancs):—Mr. W. D. H. Greg[illegible] to be assistant general manager of the company's [illegible]burgh factory, taking up his duties towards t[illegible] of the year; Mr. J. P. Newberry to succeed Mr. Gregson as London area manager from November 1; Mr. P. McGregor to the position of senior transformer sales engineer, London area, also from November 1; and Mr. J. C. Heywood to be sales manager [illegible] electronics department, being succeeded in the [illegible]ment department by Mr. H. L. Harrison as d[illegible]mental sales manager.

English Steel Corporation, Limited, Sheffiel[illegible] appointed the following special directors:—Mr. [illegible] Chatterton, chief engineer; Mr. A. M. Simmers, secretary and chief accountant; Mr. A. Taylor, c[illegible]ef accountant of the subsidiary companies. Mr. Ch[illegible]ton joined the firm in 1958 after a career in [illegible] and engineering in India and is responsible [illegible] constructional and engineering activities of the [illegible] company. Mr. Simmers was secretary and chi[illegible]countant of Firth-Vickers Stainless Steels, Limi[illegible] which he is also now a director, before joining [illegible] Steel Corporation in 1955. Mr. Taylor join[illegible] Corporation in 1936 and is responsible for a[illegible] procedures affecting manufacturing and selling [illegible]tions of the group.

Sir Stanley Rawson, vice-chairman of Joh[illegible] & Company, Limited, has retired from the [illegible] that company and from the boards of the subs[illegible] on which he still sat—John Brown & Company ([illegible] bank), Limited, Wickman, Limited, Construct[illegible] Brown, Limited, and S. B. Bridges & Company, Li[illegible]. Lord Clitheroe and Mr. Eric Mensforth have [illegible] been appointed a deputy chairman of John [illegible] & Company. Chairman of Borax Consolidated, Lim[illegible]ted, and Borax (Holdings), Limited, Lord Clitheroe is [illegible] a director of Tube Investments, Limited, and other [illegible]panies. Mr. Mensforth is chairman of Firth [illegible] Steels, Limited (Canada), and Firth Brown (Canada), Limited, and managing director of [illegible] Brown Tools, Limited, and a director of many companies.

Mr. C. H. Frankland, who has retired from the board of British Insulated Callender's Constru[illegible]n Company, Limited, London, W.C.2, joined Caller[illegible]s Cable & Construction Company, Limited, in 191[illegible] and on the amalgamation of that company with B[illegible]tish Insulated Cables, Limited, he became manager, [illegible]wer and telephone cable contracts. He has been c[illegible] board of British Insulated Callender's Constr[illegible] Company since its formation in 1949. Mr. R. B[illegible] whose appointment as an executive director o[illegible] the company is announced, first joined Callender's Cab[illegible] & Construction Company in 1919. He comes to his la[illegible] post from Canada, where he was a director and gen[illegible]al manager of Phillips Electrical Construction Comp[illegible]y. Mr. R. A. Turpin has been appointed manager [illegible] the Exeter branch—at 40, Whipton Village R[illegible] Whipton (Devon)—of BICC. He succeeds Mr. H. F. Bicker who has retired.

The death has occurred of Mr. Mark Crawsh[illegible] a former director of the Heckmondwike iron and s[illegible] firm of John France & Company, Limited, with wh[illegible] he was associated for more than 30 years.

quipment and Supplies

ir-cylinders

eet a demand for a robust, small-bore air- of light construction, Baldwin Industrial Con- rooklands Works, Dartford, Kent, have intro- hree new basic models to their range. The ¾, 1 and 1½ in., with strokes ranging from the ¾-in. bore size to 10 in. for the 1½-in bore Cylinders can be either double- or single- with spring return. These cylinders have been primarily for light holding, clamping, or jobs where small physical size combined with construction are first considerations. The n air pressure specified is 150 lb. per sq. in.

ould Closing Machine

lds Hygrade Castings, Limited, Albion Foundry, Harrowden, Wellingborough, are making a press designed to give rapid and positive closing two halves of a shell mould, using an adhesive compound—it can be used in conjuction with ethod of making shell moulds. Briefly, hine (Fig. 1) uses a multiple system of spring- plungers which apply pressure uniformly to les of a shell, the upper and lower plungers nding with one another. The upper set are in a movable table which is lowered, by a pneumatic cylinder, on to the shell mould. le, in effect, forms the movable head of the press.

ver Tables

are two lower mould-carrying tables, which rollers and are equipped with plungers corres- to those on the movable head. These lower ove laterally in such a way that one table is aded whilst the other is in the press. When has been applied for the time, and the upper head he loaded table pushes the ith the closed mould to the ng position, where the is removed and the table d. There are, therefore, ations—for loading, closing oading—and the two lower huttle backwards and for- hrough these stations.

ity

using a powdered adhesive, terial can be applied to a f-shell by means of a per- tray, the holes of which ond with the pressure f the closing machine. A dhesive is applied in the ional manner, and it is that the machine will cope well with cold, warm or lls. Closing time depends e type of adhesive, but can hort as 30 sec. when using er and hot moulds straight e curing oven. In such a e machine would handle 100 moulds per hr. One ly is needed to operate the which will take shell up to 6-in. deep; pressure varied from a few lb. up to Any number of plungers can be accommodated, and it is stated that positions of the plungers may be altered to suit changes in mould design in a matter of minutes.

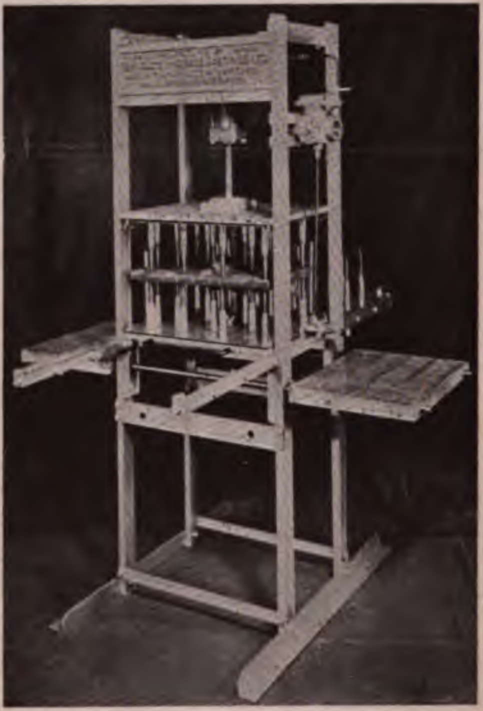


FIG. 1.—*Shell-mould closing machine with one pair of shells in the "pressure - applied" position. Inset: closing machine with both lower tables in the withdrawn position Under a new arrangement, the foundry division of Efco, Limited, Weybridge, Surrey, have been made manufacturing licensees for this equipment by Reynolds Hygrade Castings, Limited, of Wellingborough.*

Drum-storage Unit

Powell & Company, Burry Port, Carms, South Wales, have designed a drum pallet made of rectangular-section hollow steel-tubing. It has no crevices to hold moisture, and is therefore suitable for use outdoors as well as indoors. Each unit carries three drums of 40/50 gall. size and may be handled by means of a fork-lift truck, the fork clearance being 2¼ in. deep. Although strong enough to permit tiering four high, each unit is light enough for one man to carry. They are symmetrical and reversible and permit safe and close packing of drums in the minimum possible space.

Gearboxes : Electropower Gears, Limited, Kingsbury Road, London, N.W.9, have recently introduced a range of vertical flange and foot-mounting gearboxes, giving two or three speeds by change ratio. These are supplied as gearboxes only for direct coupling or belt drive, or as motorized units with, if required, electric motors. The range covers from ⅛ to 150 h.p. approximately. Reversing gearboxes are also available covering the same range.

Heat-resistant Conveyor Belt : Dunlop Rubber Company, Limited (Belting Division), Speke, Liverpool 24, have developed a new synthetic-rubber conveyor belt (Star-hete), designed to handle hot and abrasive materials. It will withstand temperatures of up to 177 deg. C., and can be supplied with a carcase weight of duck, and in ply ratings, to suit all conditions and loads.

Mr. PH. SCHNEIDER, director of the German Foundry Technical Association (VDG) and Editor of *Giesserei*, has been awarded the degree of Dr. Ing. by the Aachen Technical High School.

News in Brief

THE SEVENTH Commonwealth Mining and Metallurgical Congress is to be held in Southern Africa during April and May 1961.

NEW OFFICES at Alvajo, on the outskirts of Stockholm, have been opened by Simmonds Aerocessories A.B., a member of the Firth Cleveland group.

THE OFFICES AND FACTORY of Colloidal Graphite, Limited, have been transferred to Sheaf Island Works, Pond Hill, Sheffield, 1. ('phone Sheffield 27397).

BRASSFOUNDERS (GRIMSBY), LIMITED, entertained a number of local businessmen to a film show and coffee evening at the Royal Hotel, Grimsby, on October 14.

The Nickel Technical Information Office, Johannesburg, announces that James Brown, Limited, Durban, have been appointed licensees for the spheroidal-graphite cast-iron process.

THREE VISITORS from an Oregon steel firm, Portland, USA, were among the guests at the annual dance of the sports club of Hadfields Limited, Sheffield, in the Cutlers' Hall on October 16.

MATHER AND PLATT, LIMITED, engineers, Manchester, have secured an order worth £220,000 from Russia for fish-canning plant. It is the second Russian contract booked by the firm since March.

THE SEVENTH INTERNATIONAL CERAMIC CONGRESS is to be held in London from May 23 to 28, 1960. Details are available from the organizing secretary, Mr. H. O. Cox, 36, Victoria Street, London, S.W.1.

THE GRANTHAM FIRM of R. H. Neal & Company, Limited, have received a contract from Red China valued at £300,000 for mobile cranes. It is thought to be the biggest order of its type gained by a British firm.

A CONTRACT for a fleet of 120 Leyland Comet tipping chassis valued at over Rs. 40 Lakhs (over £300,000) has been placed with Ashok Leyland, Limited, of Madras, by the Central Public Works Department, Bombay State.

AT SEPTEMBER 15 the average level of retail prices compared with the level at January 17, 1956, (taken as 100), was 109, the same figure as at August 18. Calculated to one decimal, the September index was 108·7 compared with 109·3 for August.

SHEFFIELD WAS VISITED by Scunthorpe health committee members and officials on October 15, to examine at first hand details of the city's clean air plans. The problems of the two towns are similar since the main industry of both is steel manufacturing.

OVERSEA SERVICE announces a six-day residential introductory course on the Middle East, which will be held at Dunford College, Midhurst, Sussex from December 8 to 14. Details are available from Sir Herbert Todd, C.I.E., at 2, Eaton Gate, London, S.W.1.

THE MIDLAND REGIONAL OFFICE of the Board of Trade moved on October 14 to Somerset House, Temple Street, Birmingham, 2 (telephone: Birmingham Midland 8221). The Midland Regional Board for Industry moved to the same address on October 12.

WORTHINGTON-SIMPSON, LIMITED, of Newark, Notts, announce an addition to their range of "Monobloc" centrifugal pumps. The new range designated type "DO," comprises open impeller-type pumps with capacities of from 10 to 360 gall. per min. and heads up to 86 ft.

THE GUATEMALAN MINISTRY OF ECONOMY has *granted* operating rights to Arenas Titaniferas del Pacifico—a new firm—to exploit titanium, iron and other ores found in the black sands of the Pacific Coast. The concession, for a 25-year period, grants exclusive rights in specific regions of the south coast.

G. HUNTER (LONDON), LIMITED, report that owing to the continuing increase in demand they have closed their factory in South Benfleet and moved to Grays, Essex. The move has been made with the intention of centralizing manfacturing capacity at Grays where the complete range of the company's products will eventually be made.

HOWELL & COMPANY, LIMITED, Wincobank, Sheffield, are sending a large consignment of steel tubes to Russia. This first order from the Soviet Union is worth £118,500 and delivery is expected to be completed early next month. It was part of a larger order secured by Tube Investments group with which the firm is associated.

THE LARGEST PROPORTION OF WORKS ACCIDENTS were caused through handling goods, and was nearly 12 per cent. higher than accidents caused by machinery, said Mr. F. Crossley, safety officer at the Sheffield steelworks of Arthur Lee and Sons, Limited, when speaking to works apprentices in the Sheffield Library Theatre, on October 13.

THE TWO 62-FT. CUPOLAS being erected at the new melting plant of the Dover Engineering Works, Limited are designed to minimize the smoke nuisance from the works. It is undertsood that the installation, which will cost about £10,000, will use 165 gall. of cooling water per minute, taken from a well in the works and pumped under pressure through the installation.

THE EIGHTH COAL SCIENCE LECTURE was delivered by Sir Eric Rideal, F.R.S., Fellow of Trinity Hall, Cambridge, on October 4 at the Institution of Civil Engineers. The lecture embodied the thoughts of a distinguished chemist, having life-long experience of surface and colloidal phenomena, on the results of coal research and their possible fields of application.

A FURTHER ORDER for cooling equipment for Iscon, Durgapur, has been placed with Heenan & Froude, Limited, of Worcester, by the Brightside Heating and Engineering Company, Limited. The latest order, for four large aquatowers and seven specially-designed air coolers, makes a total of 10 water coolers and 25 air coolers, supplied by Heenan's for Iscon's various mills.

RECRUITMENT for the iron and steel industry had recommenced, said the quarterly report on unemployment in Rotherham on October 13. This was the first definite sign of a trade revival for more than a year. The wholly-unemployed register had fallen by 100 this year. Order books were in a much healthier state and the Exchange had been able to cancel one of its two paying-out days. The total number of unemployed was 670.

A £10,000 ORDER for 12 mobile air-compressors has been obtained from the Greek Government by the Hymatic Engineering Company, Limited, Redditch. The compressors will be used to operate rock drills and concrete breakers in the Greek mountains, and are of the type which can be rapidly dismantled into separate units so that they can be carried on muleback. The contract was gained in face of competition from Continental manufacturers.

ON BEHALF of an Australian company to be formed, the Federal Government has accepted the tender of Ransome & Marles Bearing Company, Limited, Newark (Notts), for land, buildings, services, and

(Continued on page 366)

r Rapid Baking . . .

SUPINOL RB314
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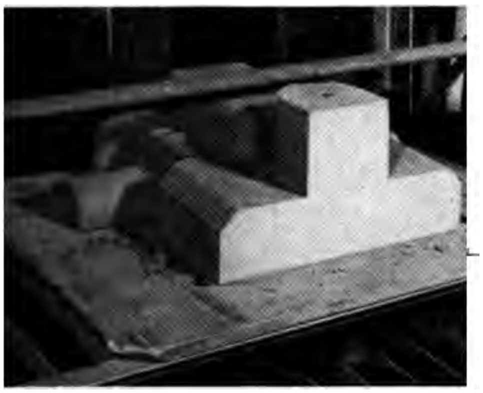
(Patent applied for)



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News in Brief

(Continued from page 364)

installations at the Government ballbearing factory at Echuca, Victoria. The tender price is £475,000 sterling. The company will buy work in progress, raw materials and the like, at an agreed valuation. The Echuca plant has been conducted by the Department of Supply since 1943.

A $600,000 (approximately £200,000) order for hydraulic equipment to be used in the building of a Canadian subway has been won by the Smethwick firm of Tangyes, Limited. The contract covers the supply of rams, cylinders, erector arms and pumps for tunnelling shields to be used in building the University Avenue subway at Toronto. It is stated that the order was secured against sharp international competition, the price and delivery dates being the key factors.

A RIM AND WHEEL factory is to be established near Madras, India, by the Dunlop Rubber Company, Limited, in conjunction with T. V. Sundram Iyengar & Sons. A new company is to be formed under the name, Wheels India, Limited. The Dunlop Rubber Company's contribution to the new enterprise, which will initially produce over 200,000 truck wheels per year, will be in the form of plant from the United Kingdom. Technical aid will be given by the Dunlop Rim & Wheel Company, Limited, Coventry.

The ELEVENTH ANNUAL DINNER of the Foxboro-Yoxall 10-year Service Club took place on September 11, at the Wimbledon Hill Hotel, London, when 117 long-service members of the staff attended. Seventeen new members were welcomed to the Club, and since this year's dinner marked the 25th anniversary of the company, there were also present six members who had completed 25 years service. The guest of honour was Mr. B. H. Bristol, president of the Foxboro Company in the USA, who presented the 10- and 25-year service emblems.

DESOLATE AREAS of Australia's inland are to be explored for minerals and oil. A party of six will leave Alice Springs this month to penetrate into unexplored country 500 miles to the west, in search of mineral deposits, and will take heavy transport to negotiate the semi-desert country. A mining survey party of 32 will search the far north of South Australia in 1960, for oil deposits in the Great Artesian Basin. The ground expedition will follow an extensive aerial survey, already made, and take three rotary drills and over 40 vehicles into remote areas.

FIVE HUNDRED GUESTS attended a reception given by the Triumph Engineering Company, Limited at its Meriden Works on October 15. The reception, the first of its kind, was held to enable dealers to see the factory and meet the people concerned with the production and sales of Triumph goods. Nearly all the company's dealers in the UK, and some from Norway, France, Belgium and Austria attended. Mr. Denis McCormack, president of the Triumph Corporation, Baltimore, USA was also present. The guests were welcomed at a luncheon by Mr. Edward Turner, the managing director.

A PROPOSAL TO FURTHER EXTEND the Smethwick works of the Midland Motor Cylinder Company, Limited, one of the Birmid Industries group, has been refused by Smethwick General Purposes Committee. The company wants to build a sand-reclamation plant but council-house tenants in the area recently staged a rent strike *after alleging* that dust, noise and smoke came from the company's nearby factory. Some members of Smethwick Town Council are opposing the refusal on the ground that it will stifle industrial development. They are urging the Council to reconsider the detailed plans of the company's application.

A FURTHER STEP towards providing after-sales service for Leyland, Albion and Scammell vehicle operators in Southern Africa has been taken by Leyland Albion (Africa), Limited, with an increase in its spares stock holding to £2,000,000. This spare parts investment, thought to be the biggest of its kind ever made in Southern Africa, represents nearly one-third of the Leyland group's investment in assembly plants, buildings, depots, vehicles and other developments in Southern Africa. The spares will be used to keep some 12,000 vehicles continuously in operation at points as far apart as Kariba and the Cape, Swakopmund and Beira.

THE MOST POWERFUL TURBO-GENERATOR in Britain came into operation at the Central Electricity Board's power-station at High Marnham, near Retford, Nottinghamshire, on October 15. It is also believed to be the most powerful in the whole of Europe, and its output is sufficient to supply the demands of a city the size of Leicester. The generator is the first of five to be installed in the High Marnham power-station. It has a capacity of 200,000 kw. (270,000 h.p.) and when all the five generators are working the station will have a capacity of 1,000,000 kw.—twice the power of the Battersea power-station. 9,000 tons of coal a day will be consumed.

MR. H. E. MATTHEWS, national industrial officer of the National Union of General and Municipal Workers, was the guest speaker at a meeting in Birmingham, on October 13, of the Birmingham branch of the Institution of Works Managers. He urged that managements should co-operate with shop stewards and said that it was likely that in future the Trades Union Congress would be given more opportunity to intervene in disputes so as to seek a solution "before they blow up." The tendency for unions to put their problems over strikes into the hands of the TUC and to accept the final advice of the Congress had already begun and, he said, the trend was likely to grow though it would take time. The problems of small groups of strikers which menaced whole works was the result of mass-production methods in industry. In these circumstances it was essential that the unions should exercise their authority.

AT A TWENTY-FIRST ANNIVERSARY LUNCHEON in Birmingham, on October 14, of the West Midlands branch of the Institute of Export, Sir Graham Cunningham, chairman of Triplex Safety Glass Company, Limited, declared that European Free Trade was bound to come, and forecast that agreement between Britain and the Outer Seven countries would be achieved by July 1 next year. The overall result, he said, would be reduced prices and an improved standard of living. Whilst some industries were liable to be hurt, it would be advantageous to Britain to enter into a free trade area with other European countries subject to many and varied limitations. Sir Graham advised exporters to anticipate the setting up of the free trade areas by preparing catalogues in foreign languages, travelling abroad and seeing the markets at first hand. In the chair at the meeting was Sir Anthony Bowlby, director of Guest Keen & Nettlefolds, Limited, and national vice-president of the Institute of Export.

MR. MICHAEL G. COHEN is taking up residence in the US as a vice-president of George Cohen 600 Inc., the US company of the George Cohen 600 Group.

If you have a dust problem, we have an answer to it—an answer based on over 30 years' specialisation in industrial dust collection. During that time, we've settled pretty well every kind of industrial dust: metal, wood, plastic, food, chemical, and so on. We've done it with the help of up-to-the-minute scientific research and the widest range of equipment made in this country: filters, large and small unit collectors, wet collectors (particularly useful for fine or explosive dust), and complete plant installations. All our collectors are self-cleaning and are designed for either fully or semi-automatic operation.
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CRC 83

Raw Material Markets

Iron and Steel

Consumption of pig-iron by the steelworks continues to grow to meet the increasing outputs of steel ingots, and additional demands are being made on producers for supplies, which are being obtained without difficulty. The usage of scrap by the steelworks is proportionately high, plentiful supplies being available. For the foundry pig-irons, the call for the different grades continues on familiar lines. Low-phosphorus pig-iron makers are disposing of substantial tonnages to the engineering and speciality foundries. Up to the present, deliveries from the several sources supplying this grade have been adequate, but in some brands supplies are becoming more restricted as demands increase. although overall production should be sufficient to fulfil the needs of the foundries.

The demand for hematite is increasing, and some refined iron makers also report improved business. High-phosphorus pig-iron demand tends to fluctuate; recent demands have shown some increase, which is easily met from current outputs. Apart from some brands of the low-phosphorus irons, substantial tonnages are held in stock by the furnaces in all grades of pig-iron.

Efforts are being continually made to interest overseas buyers in supplies, and reasonable tonnages are being shipped, mostly in the higher phosphorus ranges.

The pattern of business among the ironfoundries remains the same. The motor vehicle trade maintains a high level of demand for high-quality castings from which the engineering and speciality foundries connected with them obtain good outputs. Production of castings at other foundries, however, is of a varying nature and, generally, is only moderate. Makers of light castings for the domestic trade maintain a fairly good rate of production, but there is plenty of room for improvement, while many of the light foundries catering for other trades are only moderately employed. The jobbing foundries are fairly well engaged, but much more business could be undertaken, and the same applies to the textile foundries.

From all areas come reports of a substantial increase in the demand for steel semis, and supplying steelworks find it difficult to undertake the business now offering except, in most instances, for delayed delivery. The re-rollers continue to obtain much improved outputs of small bars and light sections, and the heavy demand for reinforcing rods continues.

Non-ferrous Metals

With no indication that the US copper strike and that at Braden's El Teniente mine in Chile are coming to an end, copper is firm again in London and the quotation is going ahead steadily. Moreover, the outlook immediately ahead looks bright and all signs point to the quotation continuing its upward course until the strikes in America and in Chile have been settled. Indeed, a New York Commodity Exchange Newsletter states that as a result of the US strike about 120,000 tons of copper has been lost, and there can be no doubt that stocks overhanging the American market must now be thinned down considerably. However, US prices remain unchanged, with producers quoting 31½ cents and custom smelters 33 cents a pound.

In London consumers appear to be taking a more definite attitude towards the market and news that strike negotiations at Kennecott have again been suspended provided strong support to the London market, which was, in any event, heading toward *higher levels following* the drop in stocks held in LME warehouses last week by 1,104 tons to
tons.

Tin is patchy in London and in New York a
in the East. This is definitely due to the co
decline in US buying as a result of the lo
strike. In fact, the Singapore price slumped
at the beginning of the week, the immediate
being the increased offerings of the metal, whi
to 250 tons on Monday. Nevertheless, the L
price is holding up well and received some enc
ment from the fresh fall in stocks last week
tons to 7,660 tons. In the US the market i
and the price has fallen below $1.02 a pound

Zinc has been an outstandingly good mark
prices are now at their highest in London sinc
1957. Prompt metal has been scarce in recent
and when it became clear there was no metal
able for October delivery the quotation wen
£96 a ton. Three months' metal also rose, bu
slowly, and the backwardation is now over £3
The outlook is good, a contention supported by
statistics, which show that UK zinc consump
running at a consistently higher rate than las
In Canada the price has been raised by ¼ c
12¼ cents a pound for "Prime Western" gra
carload lots. In the US the market is stead
prospects are that the price will be raised in th
future when the steel industry gets back i
stride. The US price remains unchanged at 1
a pound.

Lead continues friendless on both sides
Atlantic. In London the price is holding the
above £71 a ton. The New York spot price
called 13 cents a pound.

Plastics Sales

Statistics of plastics materials in the second
of this year show that not only have sales fu
covered from the slackness of last summer, bu
once again they are expanding very strongly
sales of 128,000 tons in the second quarter
year compare with 114,000 tons in the firs
100,000 tons in the second quarter of last year
biggest expansion in sales once again occur
thermoplastic materials; sales of all types of t
setting materials were higher than a year
Although still small in terms of tonnage, s
polyesters and epoxide resins continued to i
rapidly. Exports in the second quarter were a
at 37,000 tons. The figures were compiled from
from over 160 firms known to have been manu
ing plastics materials, whether for sale or for
the production of plastic goods or incorpora
other goods.

ISI Meetings

The Iron and Steel Institute announce th
autumn general meeting will be held in Lon
December 2 and 3, and that the 12th Hatfield M
Lecture will take place in Sheffield on Novem
It is also announced that the annual general
in 1960 will be held in London from May 3 to
annual members' dinner being held at Gr
House, Park Lane, London, W.1, on May 4,
There is to be a special meeting in Italy fro
29 to June 11, 1960.

THE OCTOBER ISSUE of the British Standards
tion's *Newsheet* lists under "New British Stan
No. 3140:1959 Fireguards for solid-fuel comb
grates (3s.), and No. 3146: Investment cast
metal, Part I:1959 Carbon- and low-alloy steel

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BELTING THAT TAKES A LOT OF BEATING

Whatever material you want to move, whatever the conditions, you'll find the conveyor belt for the job in the Goodyear family tree! For abrasive coke or hot sinter . . . oily materials or sharp stone . . . food and coal . . . a 'job-designed' Goodyear belt is your best choice for longest, low-cost performance. Special features include: good troughing, high impact resistance and flex life, and resistance to mildew. Get in touch with Goodyear now for Britain's most comprehensive conveyor belt service.

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- Plies of close-woven cotton duck, or synthetic fibres, mildew inhibited
- Skim coat between plies to increase flexibility, prevent separation
- Substantial edge cover to resist wear

GOODYEAR

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The Goodyear Tyre & Rubber Company (G.B.) Ltd., Industrial Rubber Products Dept., Wolverhampton

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

October 21, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over. £23 5s. 0d.. delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 10-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy). —4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free. £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic. Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons. £43 16s. 6d.; free-cutting. under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £243 10s. 0d. to £244 0s. 0d.; three months, £239 0s. 0d. to £239 10s. 0d.; settlement, £244 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 2¾d. per lb.; rods, 250s. 6d. per cwt. basis; 20 s.w.g., 285s. 6d. per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £794 0s. 0d. to £794 10s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—Second half October, £71 12s. 6d. to £71 15s. 0d.; second half January, £72 10s. 0d. to £72 12s. 6d.

Zinc.—Second half October, £96 15s. 0d. to £97 0s. 0d.; second half January, £93 0s. 0d. to £93 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £125 12s. 6d.; rolled zinc (boiler plates), all English destinations, £123 7s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £101 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10¾d. per lb.; sheets to 10 w.g., 202s. 9d. per cwt.; wire, 2s. 8½d.; rolled metal, 202s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £158; B6, £206.

Brass (High Tensile).—BS1400, HTB1, £191; HTB2, £208; HTB3, £220.

Gunmetal.—BS1400, LG2, £197; LG3, £207; G1, ½%, £258; G1, 1%, £246.

Phosphor Bronze.—BS1400, PB1 (AID released), £292; BS1400, 90/10/1, £275.

Leaded Phosphor Bronze.—BS1400, LPB1, £216.

Phosphor Bronze Strip, etc.—Strip, 290s. 3d. per cwt.; wire, 4s. 1d. per lb.; rods, 3s. 4½d.; tubes, 3s. 4½d.; chill cast bars: solids 3s. 3½d.; cored 3s. 4½d. (Charles Clifford, Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056. 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2½d. All prices are net.

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Company News

S.G.B. (Dudley), Limited, manufacturers of firebricks, of Dudley (Worcs)—No dividend is recommended on the £150,000 ordinary capital for the year ended June 30, 1959, against 6 per cent. A loss of £10,146 was incurred, compared with a previous profit of £29,698.

Head, Wrightson & Company, Limited, engineers and ironfounders, etc., of Thornaby-on-Tees (Yorks)—A one-for-two scrip issue is announced. The directors forecast a total dividend for the year to January 31, 1960, of 14 per cent. on the increased capital, against an equivalent 13¼ per cent., although they expect lower profits for the period.

Pickford, Holland & Company, Limited, manufacturers of refractories, etc., of Sheffield—The company is reducing the distribution from 20 to 17½ per cent. for the year ended June 30, 1959. The final dividend is unchanged, but the bonus of 2½ per cent. is not repeated. Trading profits fell to £221,306 (£325,499) and the net profit stands at £61,597 (£95,034) after tax of £46,250 (£123,250).

Aurora Gear & Engineering Company, Limited—To provide capital for further expansion the company is to double the authorized capital to £500,000 by the creation of 250,000 redeemable cumulative 7 per cent. £1 preference shares. The directors are at present negotiating the acquisition of another business, but they are not yet in a position to give details, states Mr. P. J. Kirkman, chairman. A new statement to shareholders will be made before issuing any of the new shares.

Dunlop Rubber Company, Limited—The interim dividend of 4d. per 10s. ordinary unit on a capital increased by a one-for-four scrip issue is the same equivalent as paid on account of 1958, when total dividends were equal to 13 per cent. on the present capital. Group sales in the first half of 1959 were £7,000,000 higher at £127,000,000 and the half-year's group net profit of £3,150,000 compares with £2,640,000 in the first six months of 1958, of which £2,630,000 (£2,030,000) is attributable to the parent company.

Dowty Group, Limited—Having regard to the changing pattern of the aircraft industry and in the interests of economy, the company intends, from April 1, 1960, to amalgamate Dowty Equipment, Limited, Rotol, Limited, and its subsidiary, British Messier, Limited. This move is in line with national policy. It is proposed that the single company resulting from this amalgamation shall operate under the name of Dowty Rotol, Limited, the joint managing directors of which will be Mr. C. J. Luby and Mr. E. J. Nicholl.

Lake & Elliot, Limited, steel and ironfounders, manufacturers of pressure equipment for the petroleum and chemical industries, etc., of Braintree (Essex) The chairman, Mr. C. J. Lake, says that a marked improvement in the demand for jacks in the latter months of the year to July 31, 1959, has not extended to steel and iron castings. Furthermore, he says, it is only by the keenest selling efforts that the foundries and machine shops in Braintree and Leven càn be kept fully employed. In meeting the fiercest competition in these fields, profit margins will be bound to suffer, he adds. Group net profits rose to £174,977 (£154,146) and the dividend is 12½ (10½) per cent.

Crossley Bros., Limited, manufacturers of diesel locomotives, marine and gas engines, of Manchester—Although the company seems to be caught up in the recession in heavy engineering, Mr. H. Desmond Carter, chairman, says that the board expects to obtain the group's share of whatever business is offering and its optimism for the longer-term future is maintained. Newer productions, which are promising well, are gradually being introduced and efforts to meet the shorter order-book situation include new developments in design, lowering of costs, and taking on sub-contracting work to keep up the load factor. The marine field continues to be the major activity.

Smith & Wellstood, Limited, stove, range, and catering-equipment manufacturers, of Bonnybridge (Stirlingshire)—Diversification into the field of commercial catering and food service has led to research activities being increasingly devoted to the development of heavy-duty equipment, including gas and electric appliances, while maintaining and improving traditional products for use with solid fuel, steam, and oil. Orders so far received in the current year show a slight increase in the home market, but conditions are still difficult in the export field. Group net profit in the year to June 30, 1959, amounted to £69,310 (£68,251) and the dividend is raised to 10½ (9) per cent.

Chas. Carr, Limited, manufacturers of non-ferrous castings, etc., of Smethwick (Staffs)—The board has taken steps to expand the company's activities by embarking on production of aluminium gravity-die-castings in aluminium bronze, says the chairman, Mr. E. C. Marsland. It will be necessary to incur considerable capital outlay on new plant and machinery to enable the company to compete in the sale of such products. Shareholders are warned that the current year will be an extremely difficult one, but the chairman says he has confidence in the ability eventually to place the business on a sound profit-making basis once more. The company's net profit for the year ended June 30, 1959, was £5,378, against £7,322 in the previous year.

Group profit, before tax, of the British Aluminium Company, Limited, now a subsidiary of Tube Investments, Limited, for the seven months ended July 31, 1959, was £1,439,007, compared with £2,210,266 for the previous 12 months. A dividend for the period of 5 per cent. is being paid. The total dividend for 1958 of 17½ per cent.—an increase of 5½ per cent.—was paid to conform with the conditional proposal of the board while the take-over battle was in progress. The new chairman, Sir Ivan Stedeford, stated that he considered it highly improbable that the rate could be repeated for 1958-59. The balance of group profit for the period, after tax and minority interests, amounted to £689,388, compared with £1,024,058 for the year 1958, the trading profit amounting to £2,004,418 (£3,070,242). Tube Investments, in conjunction with Reynolds Metals of the US, having acquired 96 per cent. of the issued ordinary capital, the board has decided to set aside under a separate heading in the balance-sheet the balance of all reserves, including the carry forward of unappropriated profit, existing at December 31, 1958, after making appropriate adjustments.

Sheffield companies which have made gifts for the improvement of the Cutlers' Hall during the past year include: James Neill & Company (Sheffield), Limited, £1,750 (reception and drawing rooms); English Steel Corporation, Limited, £4,000 (main hall); Firth Brown Tools, Limited, £921 (crystal chandeliers in the old banqueting hall); Samuel Osborn & Company, Limited, £750 (main hall); Edgar Allen & Company, Limited, £500 (crystal candle brackets in main hall); Newton Chambers & Company, Limited, £4,000 (ladies' cloakrooms).

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ECSC Record Steel Output

An all-time record level of 5,538,000 tons was reached in the output of crude steel (ingots and castings) in the European Coal and Steel Community in September. The August figure was 5,072,000 tons and in September, 1958, 4,794,000 tons was produced .The previous record month was October, 1957, when 5,444,000 tons was produced.

The effects of booming industrial production are now evident in all six Community countries and in each of them steel output was substantially higher than a year earlier. Increase in German production was outstanding, at 21.5 per cent., Italy showed an increase of 12.3 and the Netherlands 11.4 per cent. Belgium and Luxembourg were both about 8 per cent. up and France and the Saar 3.2 and 2.3 per cent., respectively.

The September figures brought output for the first nine months of this year to 45,821,000 tons—4.7 per cent. more than the 43,779,000 tons of the corresponding period in 1958. The forecast of this year's production is now a record total of 62,500,000 tons.

Output of pig-iron and ferro-alloys in September was also substantially higher than a year earlier, reaching 4,058,000 tons, compared with 3,859,000 tons in August and 3,558,000 tons in September, 1958. This brought output for the first nine months of the year to 33,971,000 tons—3.8 per cent. more than the 32,715,000 tons of the corresponding period of 1958.

ECSC coal output last month rose sharply to 19,408,000 tons from the low August level of 17,751,000 tons, but was still nearly 1,000,000 tons below the total of 20,397,000 tons recorded in September last year. The rise in stocks during September slowed down to negligible proportions. The Community's coal production for the nine-month period, at 174,139,000 tons, was 6.01 per cent. below the total of 185,278,000 tons for January-September, 1958.

Board Changes

H. M. Hobson, Limited—Mr. J. Cowell has been appointed a director.

Manganese Bronze & Brass Company, Limited—Mr. C. F. Deans has been appointed a director.

Lapointe Machine Tool Company, Limited—Mr. R. Holmes has been appointed to the board and will continue as secretary.

Dowsett Engineering Construction, Limited—Mr. J. M. N. Uren has been appointed to the board as an assistant managing director.

Brown Bayley Steels, Limited—Mr. James S. Ridges, commercial director, has retired at the age of 65, but retains his seat on the board.

Timken Roller Bearing Company—Sir John Pascoe, chairman and managing director of British Timken, Limited, has accepted an invitation to join the board of the American parent company.

English Electric Company of Australia (Pty.), Limited—Mr. E. C. Fox, general manager of the English Electric Company of India (Pvt.), Limited, is to be managing director from the beginning of January, in succession to Mr. C. W. Goodman. Mr. Goodman has passed the normal retiring age, but will continue as chairman. Mr. Fox is succeeded as general manager of the Indian company from November 1 by *Mr. N. P. Dingwall.*

Increases in Capital

W. P. Butterfield, Limited, Shipley (Yorks), incre £750,000, in 5s. ordinary shares, beyond the registered of £750,000.

Northern Diecasting Company, Limited, Burnley, i by £12,000, in £1 ordinary shares, beyond the r capital of £13,000.

Metallum Engineering Company, Limited, Cradley (increased by £9,000, in £1 ordinary shares, beyond th tered capital of £1,000.

Haybridge Steel Company, Limited, Wellington (increased by £65,000, in £1 ordinary shares, beyond th tered capital of £35,000.

Builders Copper Tube Company, Limited, London. increased by £100,400, in £1 ordinary shares, beyond th tered capital of £50,100.

Visco Engineering Company, Limited, Croydon (I increased by £105,000, in £1 ordinary shares, beyond th tered capital of £120,000.

Parsons Chain Company, Limited, Stourport-on-Severn (increased by £475,000, in £1 ordinary shares, beyo registered capital of £25,000.

Haywards, Limited, ironfounders, etc., of London, increased by £125,000, in £1 ordinary shares, beyo registered capital of £125,000.

Neath Steel Sheet & Galvanising Company, Limited, (Glam), increased by £525,000, in £100 ordinary shares, the registered capital of £75,000

Aston Aluminium Warehouse Company, Limited, Edg Birmingham, increased by £20,000, in £1 ordinary beyond the registered capital of £1,000.

Thos. Ryder & Company (Manchester), Limited, I engineers, etc., of Manchester, increased by 55,000 £1 beyond the registered capital of £20,000.

Brown, Davidson & Company, Limited, machinery m turers, etc., of London, S.W.1, increased by £24,000, shares, beyond the registered capital of £1,000.

Wm. Wadsworth & Sons, Limited, lift makers, hoist facturers, etc., of Bolton, increased by £120,000, in 5s. o shares, beyond the registered capital of £180,000.

William Heaton & Company, Limited, brass and iron fo etc., of Rotherham (Yorks), increased by £50,000, in classified shares, beyond the registered capital of £5

Thos. Hill & Company, Limited, engineers, met machinery merchants, etc., of Derby, increased by £3 £1 ordinary shares, beyond the registered capital of

Stainless Developments, Limited, stainless steel ins manufacturers, etc., of New Barnet (Herts), incre £9,000, in £1 ordinary shares, beyond the registered ca £1,000.

Cintride, Limited, manufacturers of and dealers in metals, etc., of Sheffield, increased by £20,000, in 2 classified shares of £1, beyond the registered ca £10,000.

National Standard Company, Limited, manufacturers and wire braid, etc., of Kidderminster, increased by in £1 ordinary shares, beyond the registered ca £175,000

London Works (Barlows), Limited, iron and steel facturers, etc., of Oldbury, Birmingham, increa £725,000, in 5s. ordinary shares, beyond the registered of £175,000.

Graham & Brown, Limited, engineers, etc., of Bla increased by £22,000, in 10,060 ordinary, 10,030 prefere 1,910 unclassified shares of £1 each, beyond the re capital of £10,000.

John Holroyd & Company, Limited, mechanical en etc., of Milnrow, near Rochdale (Lancs), increa £1,000,000, in 5s. "B" ordinary shares, beyond the re capital of £1,500,000.

S. H. Heywood & Company, Limited (formerly S.H.H chester, Limited), engineers, etc., of Reddish, near St (Ches), increased by £161,900, in 287,800 ordinary sh 10s. and 18,000 preference shares of £1, beyond the re capital of £100.

Changes of Name

Among companies which have recently c their names are those listed below. The new are given in parentheses.

Kenneth Wilmot, Limited, Kendal Street, Clitheroe (Neotechnic Engineering, Limited).

David Etchells & Son, Limited, Bull Piece Works, Da Staffs (David Etchells (Machinery), Limited).

H.N.J. Engineering Facilities, Limited, 124, High Dorking, Surrey (Thompson Machine & Tool Co Limited).

E. T. Developments, Limited, manufacturers of engine cars, etc., of 4, Bennetts Hill, Birmingham (B.S.A. E ments, Limited).

Tunney (Mining & Civil Engineering Contractors) C Limited, 29, Wellesley Street, Shelton, Stoke-on-Trent ((Engineering), Limited).

FOUNDRY
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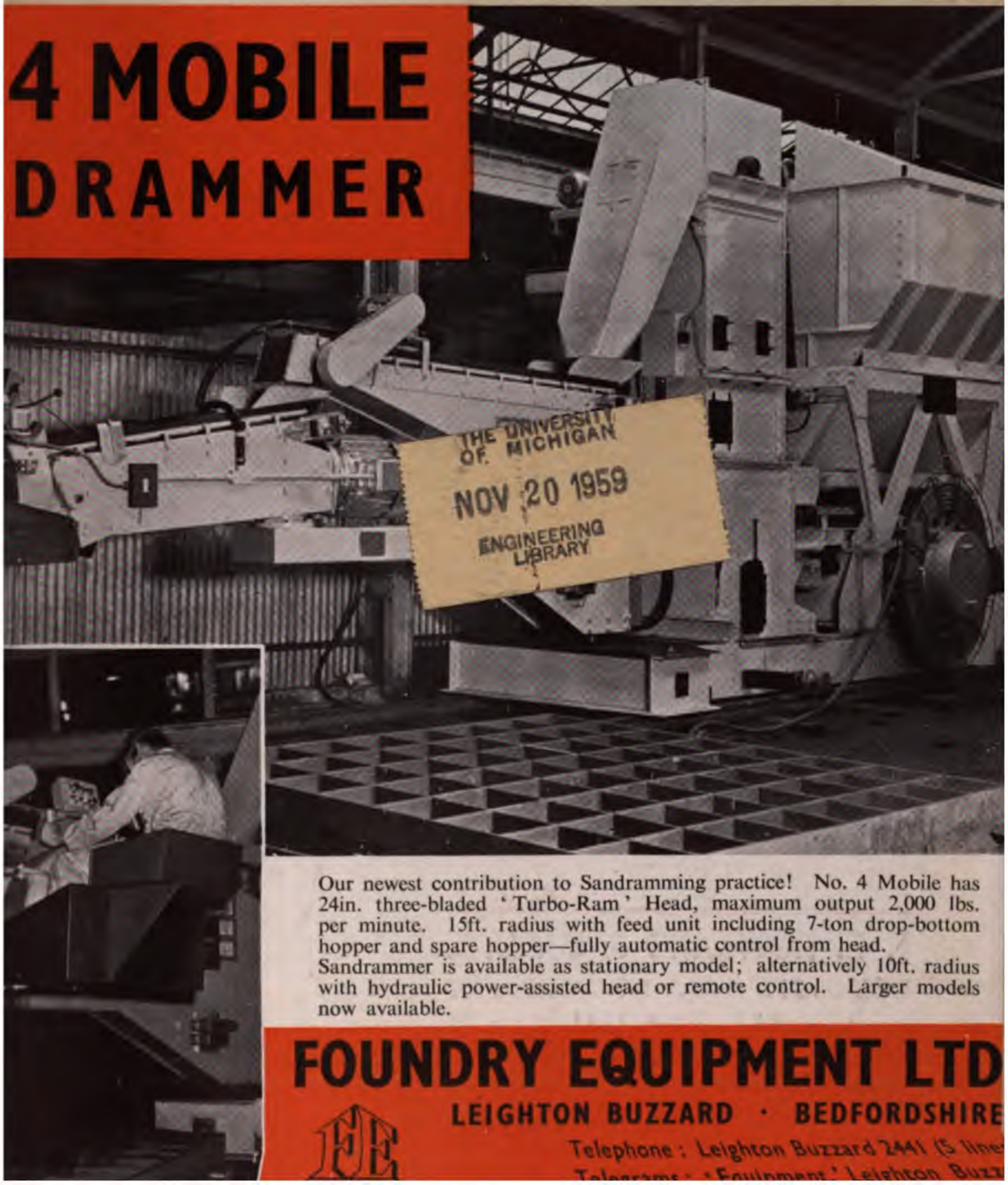

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Vol. 107 OCTOBER 29, 1959 No. 2238

The Art of Moulding

For the fifth consecutive year, the British Steel Castings Research Association has held a conference to exchange experiences on some important phase of foundry activities. This year, at Harrogate, the theme was the basic one of mould making. It attracted a high percentage of attendance from this small compact industry, the research activities of which, according to Mr. Frank Rowe, cost more per member than any comparable industry. Despite this, not merely satisfaction is generally expressed, but real enthusiasm is evinced for the work it achieves. Dr. Sully, the director, referred to the extensions now being undertaken at the research station at Sheffield and expressed a confident belief that the extra space being made available would materially benefit the economy of the industry. The testing of some modern plant does make serious demands on floor room.

A feature of the research work being undertaken by BSCRA is the intelligent use that is being made of photography. One outstanding example is a coloured film which shows the effect of heat on a flat cope of a mould. By cutting away a portion of the bottom box and training the camera on the cope during a cast, a colour film was made, which showed materially that with the sand used there was a continuous rain of fine particles. This work has won well-merited approbation at the international scientific and industrial film exhibition. A similar technique has been used to demonstrate the worth of mould paints when subjected to elevated temperatures.

The two-day conference was essentially " down to earth " and this included the contribution made by the guest speaker, Dr. I. J. Petrzela, the Czech foundry expert who was granted a Patent for the CO_2 Process. In his limited command of the English language, he candidly answered the twenty questions put to him by his audience arising out of the film he had taken showing the manufacture of sizeable steel castings by this process. Commenting on the practical aspects of the conference, the chairman, Dr. Hunter, pointed out that costs directly allocated to moulding and coremaking were probably of the order of 15 to 20 per cent, and any departure from good practice had its immediate and adverse impact on the cost of operating the melting, cleaning and dressing, heat-treatment and machining. Everybody must agree with him that a very wise step was taken when it was decided to make the theme of this conference the art of moulding.

International Congress, 1960

The 27th International Foundry Congress, organized jointly by the Association of Swiss Iron Founders and the Association of Swiss Metal Founders, will be held next year in Zurich, Switzerland, from September 19 to 24. The general theme of the Congress will be "Better Working Conditions and Technical Progress in the Foundry Industry," and the technical papers to be presented will be arranged in three groups: (*a*) recent research in the field of foundry techniques; (*b*) modern methods in foundries; and (*c*) the man in the foundry. During the Congress, meetings of the International Committee of Foundry Technical Associations and of various sub-committees and working groups will be held, and visits will be made to Swiss foundries and engineering works.

A brief outline of the programme is as follows. The official opening will take place on the morning of Monday, September 19, at the Congress House, Zurich; in the afternoon there will be technical sessions and meetings of the various committees. The next day, Tuesday, will be devoted to works visits and tours, and on the Wednesday, after technical sessions all day, there will be a social event in the evening. An excursion by steamer on the Lake of Lucerne will take up the whole of Thursday, and on Friday there will be more technical sessions and works visits. The Congress will be officially closed on the morning of Saturday, September 24.

Three post-Congress tours have been arranged, each commencing and finishing in Zurich. The first will take in St. Moritz and Lugano; the second, the Susten Pass, Interlaken, the Jungfrau Glacier and Berne; and the third, Montreux, Gstaad and Berne. A special programme is being prepared for the ladies.

European Foundry Apprentice Competition

Detailed arrangements for the European Foundry Apprentice Competition have now been finalized. The Competition will be held in the Midlands from May 23 to 27, 1960. Those apprentices taking part in the Competition will be housed at Tor Lodge, the hostel of the National Foundry College. The written part of the Competition will be held at the National Foundry College, Wolverhampton, and the Birmingham College of Advanced Technology, whilst F. H. Lloyd & Company, Limited, Wednesbury, have kindly offered space and facilities for the practical tests to be carried out. The competitors, judges and delegates will arrive in Birmingham on May 22, and on Friday, May 27, the party will travel to London for the closing ceremony (including a farewell dinner) and distribution of prizes.

The selection of written questions and practical tests to be used for the Competition was decided upon at a meeting of the judges held last month at the offices of the Council of Ironfoundry Associations. Dr. J. G. Pearce was in the chair at this meeting and representatives from France, Germany, Belgium, Holland, Italy, and the UK were present. Each country submitted a number of questions on technology, calculations and drawing for consideration, and from these, the questions to be used for the actual Competition in May were chosen.

Arrangements to select the English competitors have been made by the Institute of British Foundrymen and, as detailed in the JOURNAL, September 3, will take the form of a competition organized on a national basis. Each candidate will have to undertake both practical and written tests and the results of these will be announced early next year.

Forthcoming Events

NOVEMBER 2

Institute of British Foundrymen

Sheffield branch:—"Co-operation and Co-ordination
Patternshop and Foundry," by E. H. Beech
Bradshaw, 7 p.m., at the College of Commer
Technology, Pond Street, Sheffield.

NOVEMBER 3

Institution of Plant Engineers

"Constructional Problems encountered in the Karib
Hydro-electric Project," by Mr. T. A. L. Pato
7 p.m., at the Royal Society of Arts, John Adam
Adelphi, Strand, London, W.C.2.

NOVEMBER 3 to 6

Institute of Welding

Autumn meeting (joint meeting with the French So
Welding Engineers), at 54, Princes Gate, London,
November 3: Works visits for French visitors;
evening presidential address and reception. No
4: Works visits; annual dinner, 7.45 p.m., at th
Lane Hotel, London. November 5 and 6: Dis
meetings.

NOVEMBER 4

Institution of Production Engineers

Nottingham branch:—"Adhesives in Engineering," by
Catchpole, 7 p.m., at the Reform Club, Victoria S

Institution of Plant Engineers

Dundee branch:—"Design and Operation of the Jodrel
Radio Telescope," by C. N. Kington, 7.30 p.m., a
park Hotel, West Ferry.

Southern branch:—"Distribution of Electrical Power,"
Samson, 7.30 p.m., at the Royal Beach Hotel, Sout

NOVEMBER 5

Society of Chemical Industry

Corrosion group, and Nottingham section:—"Co
Factors affecting the Choice of Stainless-stee
Chemical Plant," by H. T. Shirley, 7.30 p.m.,
Demonstration Theatre, East Midlands Gas Board,
55, Lower Parliament Street, Nottingham.

Institute of British Foundrymen

Stoke-on-Trent section:—"Modern Developments in
Aluminium-base Alloys," by H. J. Proffitt, 7.30 p.
the Stipendiary Court Room, Hanley Town Hall.

NOVEMBER 6

Institute of British Foundrymen

Tees-side branch:—"Some Experiences in the Manu
of Steel Castings for High-pressure Turbine Compo
by G. L. Hancock and J. Taylor, at Darlington
from secretary).

West Wales section:—"Consistent Cupola Operatio
R. Jelley, 7 p.m., at Richard Thomas & Ba
Limited, Landore Works.

NOVEMBER 7

Institute of British Foundrymen

Wales and Monmouth branch:—"Consistent Cupola
tion," by R. Jelley, 6 p.m., at the Engineers' In
Cardiff.

Latest Foundry Statistics

Light Alloys: The Ministry of Supply belated
nounce that during July the foundry industry
factured 1,476 tons of aluminium castings from
moulds, 3,975 tons were made as gravity-die and
tons as pressure-die-castings. In the same mont
tons of magnesium castings were also produced

Steel Castings: Monthly Statistics, the *Bulletin*
jointly by the Iron and Steel Board and the Britis
and Steel Federation, indicates another decre
employment—actually in August it was 320 fewe
on July 4, the total being 17,230. The average
production of steel castings during August was
tons, the same figure as for July; a year ago
4,100 tons. It should be noted all these tonnag
estimated.

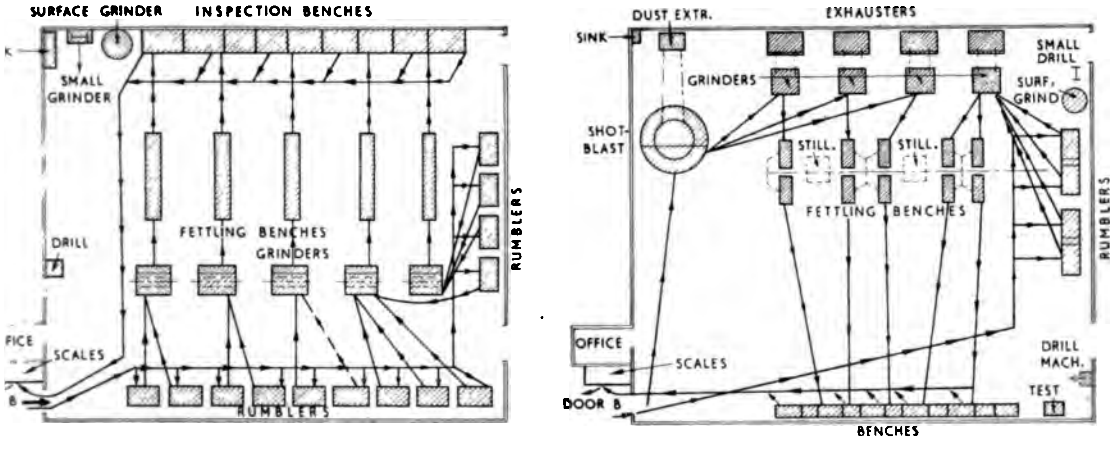
eorganization of a Fettling Shop

ption of Flow-production Methods and
v Plant at R. & A. Main's Edmonton Foundry

Following a brief summary explaining the set-up at the Edmonton foundry, the contributor of this article, Mr. E. Holland, foundry superintendent at R. &A. Main's, first discusses reasons for the changes and then details the alterations. Often, the layout of plant in existing foundries and ancillary shops becomes more and more confused as each new unit is added. Thus, it is sound policy at a time when major equipment changes are being introduced to reconsider the shop as a whole—revising machine position, etc. to suit a new conception of work-flow. This is what Mr. Holland has undertaken and the account records his procedure and the results secured—which include better working conditions, less lifting and transfer within the shop, and not least, higher production at less cost. (This foundry is to be visited tomorrow by a party from the Institute of British Foundrymen).

he main products of R. & A. Main, Limited, of ionton, are gas cookers and gas and electric gerators. In addition to meeting the require-ts for these appliances, the company under-s castings manufacture as sub-contract work outside firms. The factory area is approxi-:ly 15 acres and some 1,350 personnel are loyed, of whom approximately 10 per cent. are ged in the foundry section. The R. & A. n foundry comprises a patternshop, coreshop, foundry, mechanized foundry* and dressing). The coreshop produces approximately 00 cores per week and is partly mechanized. floor foundry averages an output of around ons of iron castings per week and deals chiefly special orders and castings that are not prac-ɔle in the mechanized set-up. The modern hanized foundry utilizes approximately 90 tons of iron per week and deals with repetitive lines, where castings are wanted in large quantities. Some of the machines make moulds 33 by 23 by 4-in. deep, each part, at the rate of a mould per minute. The castings are mostly light and of thin section, and have a small iron: mould ratio.

In the past, the dressing shop at Main's has had various modifications carried out to plant and equipment from time to time. A short time ago, however, the increased foundry output called for a major revision of dressing-shop practice, and so the whole shop was studied with a view to re-equipping with modern machinery. Following this study, models of equipment were made and placed in various trial layouts, and such things as flow of work, means of access, and safe working-conditions were again considered. Finally, machines were purchased and installed (see layout, Fig. 1). The following account describes these procedures and details the improvements stemming from a logical approach to the various problems studied.



1.—*Old* (*left*) *and new layout* (*right*) *of R. & A. Main's fettling shop. Arrows denote the direction of work flow.*

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escribed in the JOURNAL April 13, 1950, under the title "Cast-iron onents for Gas Cookers."

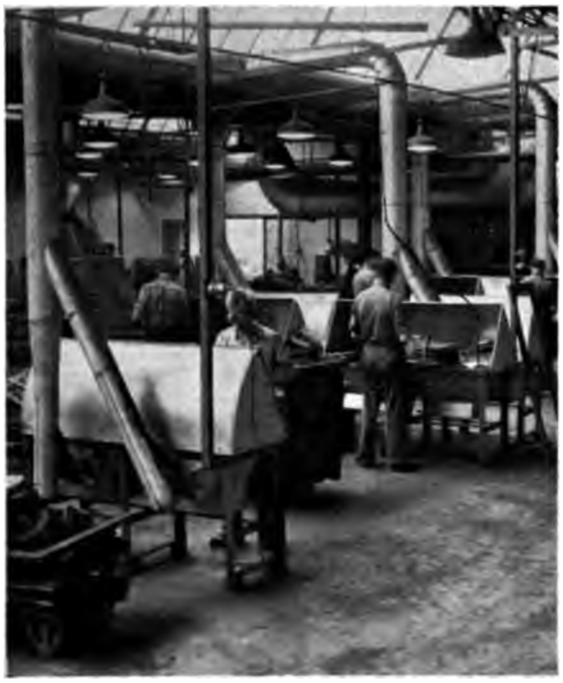


FIG. 2.—*Some of the fettling benches at R. & A. Main's, showing the hoods and extraction method.*

DRESSING-SHOP REORGANIZATION

The dressing of castings poses numerous problems and particularly that of dust control. Further difficulty is created by castings which arrive from the mechanized plant where only part of the sand is removed at the knockout. The R. & A. Main mechanized plant was first installed in 1947 and considerable modifications have been made from time to time to keep it modern, give better sand control and obtain greater efficiency with corresponding increase in output. This had all increased the strain on the dressing shop which, although it had had some modification, needed to be re-studied in the light of recent Factory Acts, to weigh up the problem anew. Should the existing machinery be modified, or was it better to re-equip with new machinery?

Planning

During the previous twelve months there had been extensive reorganization in company production which had led to expansion of the company's planning department, which guides and advises on reorganization and new ventures, and so permits works executives to carry on with their normal supervisory duties. This service was freely available to cope with the dressing-shop reorganization and greatly assisted in the speed with which the whole scheme was completed. From the date the Board sanctioned the scheme, until completion, only 17 weeks elapsed, and when it is borne in mind that manufacturers seldom have machines in stock, but only build machines against firm orders, it showed that real "drive" was applied.

The study of the various problems of dressing castings was considered in the light of modern development and various authorities were consulted, including the British Cast Iron Research Association and H.M. Inspector of Factories. Their various points of view were carefully considered and had an influence on the types of machines that were finally installed. The main questions to be resolved were: Did the plant and equipment proposed comply with the Factory Regulations; were the new appliances efficient in their manipulation and the amount of work they would do; was their design standard, so as to permit easy purchase of spares as and when required; were they economical to run as regards power? Finally, would the men in the department take kindly to the new equipment? The following gives individually the reasons which influenced the type and make of machine finally chosen and installed.

Power Tools

Air-operated grinders to take "pencil" stones had already been in use, but owing to the

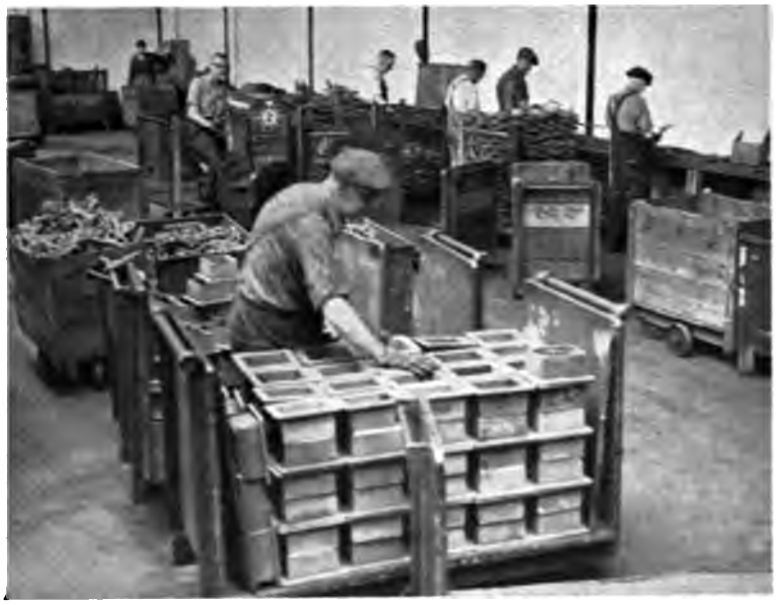


FIG. 3.—*Inspection benches in the fettling shop at Main's: they have cast-iron legs and removable cast-iron table grids*

.—*Pedestal grinders at Main's, fitted with independent Spencer Halstead dust-arresters and BCIRA dust-extraction units.*

essing shop being on the remote end of the
essed-air line, there was seldom sufficient air
intain the speed of the grinders—with con-
t loss in efficiency as well as heavy wear on
Two courses were open:—One was to
a new compressor and the alternative to
over to electrically-driven grinders. Hicycle
grinders seemed a reasonable proposition
portable 5-kw. frequency-changer was
ved, together with a number of Hicycle pencil-
grinders in order to carry out shop trials. It
ound that, compared side by side with air
rs—and on the type of castings in production
& A. Main's—these were faster-cutting and
to their constant speed there was less wear
nes. In addition, it was found that elec-
was cheaper than compressed air, Hicycle
nent giving approximately 60 per cent.
icy against air grinders' 15 per cent.

as found that eight Hicycle grinders using
stones and one 4-in. portable grinder could
ven from a 5-kw. frequency-changer. Air
d for air grinders to do the same work would
roximately 1,000 cub. ft. per min., at 90 lb.
in. The frequency changer was also cheaper
chase than a compressor.

Fettling Benches

ther disadvantage with the air grinders pre-
in use, was that the air exhaust kept dust
ion and this made it very difficult to extract
iently. This was most apparent with the old wooden fettling benches, so it was decided to put in new benches with cast-iron legs and removable cast-iron table grids. Ten of these benches were made and fitted with extraction hoods and also closed-in trays underneath, air extraction being through the grids at the rate of 1,000 cub. ft. per min. for each bench (Fig. 2). Similar benches were made for the castings inspectors, but here it was not considered necessary to fit extraction hoods. These benches can be seen in Fig. 3 along the right-hand wall.

Pedestal Grinders

Five pairs of pedestal grinders using 18-in. dia. grinding wheels had been installed in the shop in 1933, but had been modified from time to time. In the light of the British Cast Iron Research Association's development work on pedestal grinders, consideration was given to further modification using the Dustuctor method of extraction. However, after further study, it was decided to look into the advantages to be gained by purchasing the latest type of high-speed pedestal grinders. The facts that emerged were that the old-type pedestal machines used 18-in. dia. grinding wheels with 1½-in. centre hole, and these were discarded when worn down to 10-in. dia., owing to castings then fouling the guards. There was also a marked falling off in grinding efficiency as the wheels wore down, due to the fact that they were single-speed machines. High-speed grinding proved to be approximately £4 0s. 0d. each cheaper—which was another

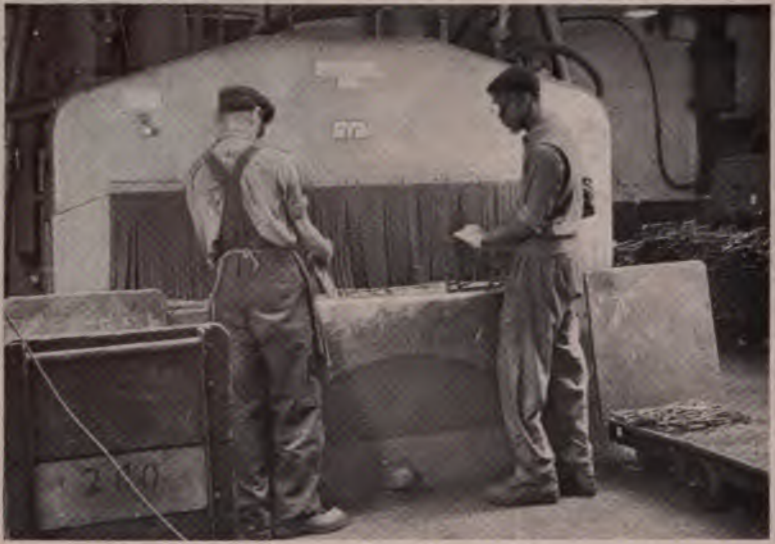


FIG. 5.—*Baker Perkins
blast plant, recently instal
R. & A. Main's foundry.*

advantage. By installing 20-in. double-ended grinders taking wheels with a 7-in. dia. centre hole with speeds variable to give surface speeds of approximately 9,000 ft. per min., a much greater length of life per wheel could be expected with less manual effort in grinding and more consistent efficiency; it was also estimated that where previously there had been five pairs of pedestal machines, owing to faster cutting, etc., with the new set-up, only four pairs were required.

Thus the final decision was made to instal three pairs of Luke and Spencer 20-in. high-speed grinders, of the variable speed type, and one pair 16-in. grinders, with fixed speed, each pair having independent Spencer Halstead dust-extractors. Each grinder has been fitted with BCIRA-type dust-extraction units; these can be seen in Fig. 4 (on the left wall).

Grinding Wheels

Considerable experiments were carried out with various grades and makes of grinding wheels, grades tried varying from a grit bond of 16.S. to 16.O. The former gave a long life but assumed a glaze in use and was heavy on the operator. The 16.O. grit was fast-cutting but the wheel wore down too rapidly causing more dust than was acceptable. The present selection is a grit bond No. 16.P. which seems to provide the best overall solution to Main's requirements.

Rumblers replaced by Shotblast Plant

For many years, castings had been cleaned at Main's in home-made rumbler barrels, thirteen of which were in operation. In these, breakages of castings due to their lightness and thinness of section was relatively high. In the new scheme, it was considered that if a shotblast of the rotary-table type was installed, nine rumbler barrels could be dispensed with, leaving four. It was also thought that there would then be less breakages, and more space for the inspectors to work in, as well as

an improvement in dust-
tion facilities for the
benches. However, owi
difficulty of removing
from such castings as
burners, etc., it was deci
keep the four rumblers
with this specialized ty
work.

The shotblast finally
was a 7-ft. 6-in. table
(Fig. 5) from Baker P
The reason for the cho
this model was that
machine required no f
tion, did not need much
room and thus no roof
tion was entailed. Additi
it was easily adjusted for speed and was
by a rubber-tyred friction drive. This ty
drive prevents serious trouble if a jam-up
on the table—the rubber tyre merely skiddi
gears being involved. Access for maintenan
easy and delivery time for the model select
short. For use with this unit, a Spencer H
dust-extractor was decided upon, again becau
delivery quoted was good and as will be
short delivery period was important as insta
of the shotblast was an essential first move
made in the reorganization.

Choice of Abrasive

Much work has been done by various aut
on the choice of shot grade and type for c
castings and so, with a new machine, the
offered an excellent opportunity to try out
types of shot. Cut steel wire was the abrasi
in the first experiment and, working almo
tinuously for nine hours per day, one ton
37 days. Angular grit gave only six days op
with one ton, round steel shot gave 38 da
round shot abrasive 35 days. The de
cleaning appeared to be better with roun
and so this material is being given an e
trial.

Installation Sequence

One essential point in planning the intro
of the new scheme was that there should
interruption in the flow of work going thro
dressing shop—which was then working s
per week. To achieve this, the shotblast w
installed and this took work away from ni
bler barrels. On taking these out, space w
available to tranfer the inspectors' workpla
the north wall (Fig. 1, left-hand sketch)
site. This gave room to instal four pairs of
grinders together with their dust-extractors
north end (right-hand sketch). The g
machine operators were then transferred
new machines and the old pedestal uni

dismantled. This now left dust-extraction units from the old pedestal and the rumblers available for serving the new fettling benches, which were installed in pairs, scrapping the wooden benches as soon as they were replaced.

All this floor planning and layout was based on securing flowability of work. As can be seen by reference to the new layout (Fig. 1) the castings arrive by door B, and pass on to the shotblast, thence to the grinders and back to the fettlers, who finally pass them to the inspectors.

Gas-burner castings, etc., go first to the rumblers and on to the grinders adjacent, they then pass to the fettlers and next to the inspectors. The inspectors pass, count and weigh all castings, weighing taking place adjacent to door B. Assessed on a time-and-motion-study basis this proved a considerable saving in movement of workpieces and caused less congestion, yet gave ample holding space for the inspectors. Castings are taken from the foundry by Lister truck, but movement within the dressing shop is mostly by hand trolley.

Conclusion

In summing up, the advantages gained to date over the five months that this scheme has been in operation are:—First, that speed of fettling has been increased on an average by 10 per cent. (it being borne in mind that although the new machines are much faster there is still the same amount of time taken in picking up and putting down castings, and breakages have been reduced by as much as 70 per cent. of what they were (as, for example, with the casting shown being handled in Fig. 5).

There is some increase in total power requirements of machinery and plant included in the new layout—as was to be expected from the increase in dust-extraction and higher-speed pedestal grinders. The horsepower figures for comparison are shown in Table 1. Shotblasting has been found to give a cleaner casting than rumbling, but does not confer the same polished appearance. Casting defects that would ordinarily only have been discovered in the enamel shop, are made more apparent by shotblasting and this again tends to lower final costs. Replacement grinding wheels are cheaper than previously and appear to be giving as much as 40 per cent. longer life. What is considered to be even more important than the purely financial aspect is that the shop is cleaner, healthier, and altogether more pleasant to work in.

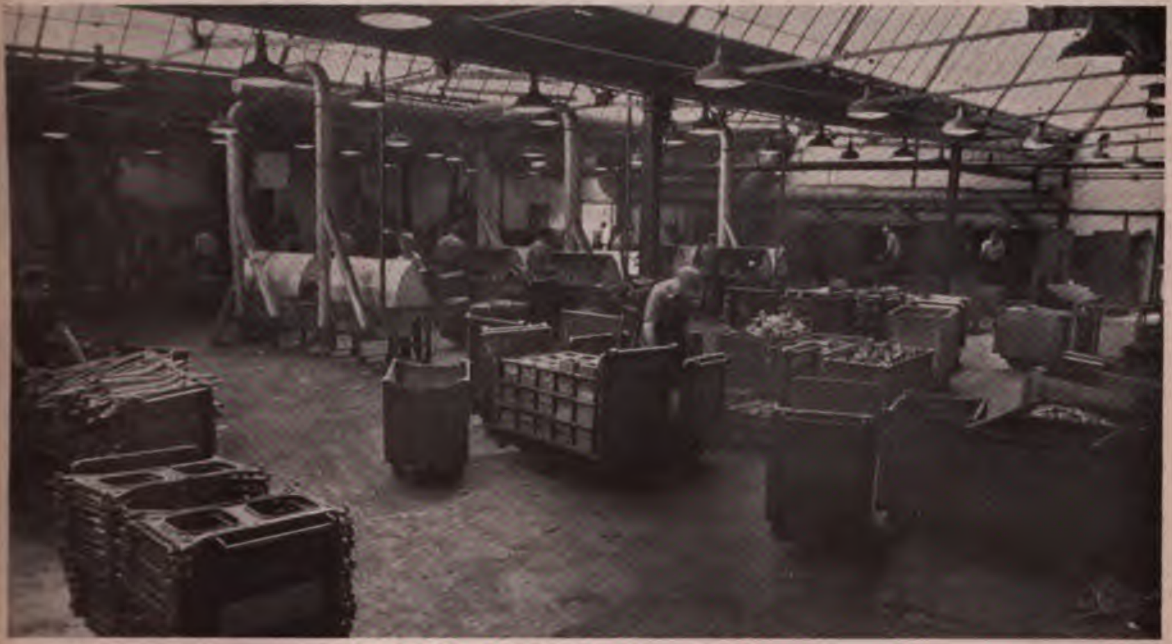
TABLE 1.—*Power Requirements Before and After the Modernization Scheme.*

	Old layout.	New layout.
Air extraction	30	75
Machine	71	80
Compressed air	20	5
Total h.p.	121	160

Acknowledgment

The Author wishes to thank R. & A. Main, Limited, for permission to publish this account, and to acknowledge help from colleagues in its preparation and illustration.

FIG. 6.—*General view of the rearranged dressing shop at the foundry of R. & A. Main, Limited.*



Aluminium Street-lighting Columns

At an exhibition in the Royal Society of Arts, which closed on Tuesday of this week, the Aluminium Development Association showed a number of winning entries and other designs of aluminium street-lighting columns submitted in their recent competition. Briefly, the competition was open to all designers in aluminium, using wrought and cast products, and a particular stipulation was that, although no ceiling was set for price, it had to be borne in mind that eventually the designs would have to be competitive with other street-column materials. Generally speaking, the entries were arranged in two classes, type A, 25-ft. high for trunk roads and type B, 15-ft. high for non-trunk roads. The object of the competition was, of course, to encourage the evolution of good design, taking into account aesthetic appearance, economy of construction, and the advantages of aluminium.

The assessors were the Hon. Lionel Brett, M.A., F.R.I.B.A., F.I.L.A. (nominated by the president of the Royal Institute of British Architects), Professor Sir Alfred Pugsley, O.B.E., D.SC., F.R.S. (past president, Institution of Structural Engineers), and Sir Gordon Russell, C.B.E., M.C., R.D.I., F.S.I.A. (director, Council of Industrial Design). The first prize of £250 was awarded jointly to Mr. J. Howe, F.R.I.B.A., F.S.I.A. (design consultant to A.E.I. Lamp & Lighting Company, Limited, in conjunction with Reynolds T.I. Aluminium, Limited, and Mr. J. B. Dwight, M.A., M.SC., A.M.I.MECH.E. (member of the Civil Engineering Department, University of Birmingham). The second and third prizes were combined (£150) and divided equally between Mr. F. J. B. Rowley (student, College of Art and Industrial Design, Newcastle-upon-Tyne), and Mr. S. L. Devlin (student, Royal College of Art, London). The students' prize (£75) was divided equally between Mr. S. L. Devlin and Mr. F. J. B. Rowley.

Cast Components

All the winning designs and practically every other design exhibited contained cast components in the construction of the columns, some of them quite substantial. For these, die-castings and sand castings were involved, some in LM 6 and others in LM8-W alloys. It was interesting to learn that five manufacturers are presently engaged in production models of aluminium lighting-columns and that a considerable number have already been installed. In most cases, the aluminium extends into the ground anchorage, the metal merely being protected by a bituminous coating.

The Aluminium Development Association are to be congratulated on the sponsoring and the carrying through of this project which, for the metal-producing industries, has as its objective the reversion to metal for components only too often now made in concrete. Lighting columns typify a case where the ironfoundry industry has in the past fought a losing battle against the use of concrete, and it will be pleasing to see a return of metal construction, bringing along with it increasing business for light-alloy founders.

THE REMAINS OF AN IRON-SMELTING WORKS, believed to date from the 17th century, have been discovered at Melbourne, Derbyshire, on a site which is shortly to be submerged for a new reservoir. The discoveries include the remains of a water wheel, believed to have been used to blow air into the furnaces.

Industrial Prospects in the Midlands

At the meeting in Birmingham, on October 20, of the Midland Regional Board for Industry, members were told that Midland industry had shown no disposition to increase its normal intake of apprentices into the skilled trades during the "bulge" years of school leavers. Mr. J. W. Eldridge, Regional Controller for the Ministry of Labour, said that a number of well-qualified school-leavers had had to compromise in their choice of career and accept their second choice. "Apparently there are more youngsters well suited for training in industry than industry is prepared to take," Mr. Eldridge said. "Industry is missing its opportunities," he went on.

The Midland total of unemployment in general had been reduced to 1.2 per cent. it was reported—the lowest level since January 1958. The figure compared with 1.9 per cent. nationally. Reviewing trade prospects, Major C. R. Dibben, chairman of the Board, said that the upward trend continued and the general mood was one of optimism, although perhaps mildly tinged with caution with regard to the long-term view. Exports continued to be satisfactory and there was improvement in the home demand. The reason for the long-term caution, Major Dibben added, was that the heavier industries were not quite so well placed as the lighter ones. Unemployment had fallen in the Midlands from 32,242 in the middle of August to 26,546 in September, and the number of vacancies was 28,220 at the last count.

Major Dibben in referring to steel supplies to the engineering industries said these were beginning to tighten, but there had been no ill-effects on production and the situation was not yet causing much anxiety; no serious complaints about shortage had yet come in.

National Foundry College

Proposed "Sandwich" Course to Start Next Year

Speaking at the dinner of the Foundry Technical Group on October 17, Mr. J. Bamford, principal of the National Foundry College, referred to the paucity of scientific education in this country, *vis-à-vis* USA and Russia, and in this context, announced that the Governing Body of the College had decided to start a three-year Advanced Course for students, to commence in the autumn of 1960. This Course, he said, was definitely not intended to supersede the present Diploma Course, but was a "sandwich" course which would involve students in alternative six-monthly periods at the College and in industry over the three-year periods. The intake would be of two types, viz.: (1) men with a General Certificate of Education at advanced level in two out of three subjects (chemistry, physics and mathematics), and (2) men of similar standing in industry having their Ordinary National Certificate in engineering, chemistry, applied physics or metallurgy. The training curriculum of these students while they were in industry would be decided jointly between the works and the College, and College staff would pay visits to the students while they were getting their works' experience. The new scheme, Mr. Bamford added, should furnish a new type of entrant to the foundry industry, quite outside the scope of the previous schemes. Publicity is to be given to the scheme before Christmas, and it is hoped to start the first course next September, Mr. Bamford said. As to the actual value of the Course to industry, only time will tell. The first students will complete the Course in 1963 and will require some years after that to make their influence felt.

velopment of a $_2$-Process Moulding Sand*

By H. T. Bidwell, A.I.M.†

An investigation was carried out to develop a CO$_2$ sand with the characteristics of a conventional moulding sand. The detrimental effects of clay and moisture on CO$_2$ sands were overcome by adding a readily ionized sodium salt, to satisfy a base-exchange mechanism between the Sodium/Calcium clay complex and the sodium silicate. The sand produced has been used for production with great success.

n applying the CO$_2$ process to mould pro- ı, several inherent disadvantages become iately apparent. The low green-strength of nd does not allow easy removal of the without serious risk of mould breakdown. mould is hardened before stripping, a large ıngle on the pattern will be necessary, or ve rapping of the pattern will be required ıbsequent loss of dimensional accuracy. The pin-lift-type moulding-machines has been , due to the low green-strength of the CO$_2$ It is not uncommon, when trying to strip ı mould, for a complete breakdown of the to occur. Roll-over-type machines have sed successfully, but difficulty in stripping is ncountered with the more complex patterns. tting and repair of floor moulds is unsatis- , due again to the low green-strength and grain-size of the silica sand usually em-

Difficulties to be Overcome

sands used for the CO$_2$ process are generally ed as dry, clay-free, silica sands. The e of clay and moisture generally makes ng impossible. If a fine silica sand is used, silicate content is necessary to prevent e friability. The selection and preparation, drying, of a suitable sand all lead to in- overhead costs. If these difficulties could rcome, the application of the CO$_2$ process hanized moulding would result in cleaner, ccurate castings with large savings on metal and machining costs. With these facts in ı series of experiments were carried out in ındry of Glacier Metal Company, Limited, luce a moulding sand that possessed both ventional properties of a green sand and the ng characteristics of a CO$_2$ sand.

Initial Tests

tests were carried out on a sand mixture s currently in use for core production. This onsisted of a mixture of Erith silica and silica sands, 3½ per cent. sodium silicate and ½ per cent. breakdown agent. Additions of organic binders such as cereal flour gave a good green-strength, but the shatter index became too high with subsequent poor flowability of the sand. Another major disadvantage was the large volume of gas generated by the binder on casting.

Clay and Water Additions

The next step in the investigation was to determine the effect of clay and water additions to the CO$_2$ sand. Previous results published by the British Cast Iron Research Association indicated that no more than 2 per cent. clay and 1 per cent. water additions were permissible. Any increase above these levels caused a rapid deterioration in the sand quality. A series of tests were carried out on various mixes, using Ryarsh silica sand and Erith silica sand as the basic raw materials. The sieve analyses for these sands is shown in Table 1.

TABLE 1.—*Sieve Analyses of the Sands used in the Initial Tests.*

Sieve size.	Erith silica.	Ryarsh silica.
+ 36	1.2	0
− 36/ + 52	19.3	0.3
− 52/ + 72	51.9	0.5
− 72/ + 100	23.3	1.2
− 100/ + 150	3.6	41.6
− 150/ − 200	0.6	48.5
− 200	0.3	5.1
Clay, per cent.	0	1.8
A.F.A. Fineness No.	60.8	130

The sand ratios were varied from 50 to 100 per cent. Ryarsh content. The clay content was varied from 1 to 5 per cent., and the moisture content from 1 to 3 per cent. The general trend showed that the gassed strength was not greatly affected by these variations, but the bench life of the sand decreased rapidly with increase in either moisture or clay content.

Sodium Silicate added

In view of the apparent wide tolerance in the clay content, sodium silicate was added to the normal moulding sand used in the foundry. This sand consists of Mansfield Red natural sand, Ryarsh silica and a clay addition. When variations of this basic mix were tested a good green-strength was obtained, and the sand had working properties that were better than the conventional green moulding sand. The sand was satisfactory when newly milled, but soon deteriorated on standing to a state where no hardening was possible.

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rocess is the subject of a Patent Application.

uthor is on the staff of Glacier Metal Company, Limited, of Middlesex.

CO_2-Process Moulding Sand

Determination of Bench Life

A more detailed series of tests were then carried out on the possibility of using the green moulding sand mix as a basis for a CO_2 moulding sand, the first stage being to determine the bench life of typical mixes. A 10-lb. mix of normal green moulding sand was milled for five min. with a 3½ per cent. addition of sodium silicate. This mixture was then tested until no hardening could be produced on gassing with carbon dioxide. The results are shown in Table 2. It will be noticed that the bench life is only 20 min. A second test with the same sand mix gave only a 17-min. bench life. Item 3 in Table 2 shows a life of one hr. for a sand mix prepared from the raw materials, and not taken from the foundry prepared sand. It was noticed that the sand gradually became powdery without loss in moisture content, accompanied by a fall in the shatter index, and then failed to harden on gassing.

TABLE 2. *Results of Tests, on three Sand Mixes, to determine Bench Life of typical Sand Mixtures.*

Time (min.).	Moisture (per cent.).	Green-compression strength (lb. per sq. in.).	Shatter index.	Gassed strength, (lb. per sq. in.).	Sand mixture (3½ per cent. sodium silicate added to each batch.) (per cent.).
Batch 1					
0	4.6	6.3	73.7	90	70 Ryarsh silica.
5	4.6	6.7	65.2	90	30 Mansfield Red.
10	4.7	6.6	60.1	90	
15	4.5	5.9	57.7	80	
20	4.6	5.9	57.1	80	
26	4.5	6.2	47.8	Not hardening	(Used sand)
32	4.6	5.7	51.0		
39	4.6	6.4	45.2		
Batch 2					
0	4.5	6.9	68.0	—	70 Ryarsh silica.
5	4.5	6.9	65.4	90	30 Mansfield Red.
13	4.5	6.9	59.6	80	
17	4.6	6.4	57.1	Not hardening	(Clay addition 6 per cent. of Ryarsh content). (Used sand.)
22	4.5	6.4	47.9		
29	4.3	5.9	49.4		
34	4.4	6.0	54.0		
39	4.4	5.9	47.2		
Batch 3*					
0	4.3	7.4	85.4	--	60 Ryarsh silica.
5	4.3	6.9	85.9	90	40 Mansfield Red.
11	4.4	7.3	86.6	100	
17	4.6	7.1	86.4	90	(Clay addition 6 per cent. of Ryarsh content.) (New sand.)
23	4.5	7.5	88.8	90	
30	4.6	7.5	86.6	90	
35	4.5	7.6	87.5	80	
40	4.6	7.8	82.9	100	

* After 1 hour the sand ceased to harden.

Significance of Base-exchange Tendency

The deterioration of the sand with time suggested some reaction between the clay and the sodium silicate, and work was directed to examine the possibility of a base-exchange reaction. There are three main clay categories: (1) Kaolinite; (2) Montmorillonite, and (3) Secondary Mica (Illitic). A study of the major clay minerals showed that the montmorillonite group has the greatest base-exchange tendency (see Table 3). Montmorillonite is a hydrated aluminium silicate with loosely held sodium calcium, or other cations, *within the structure*, giving sodium or calcium montmorillonite. Sodium montmorillonite is the main mineral of Wyoming bentonite, whilst calcium montmorillonite is the main constituent of Fullers earth. By adding a small percentage of sodium carbonate to a calcium montmorillonite, an exchange of metal cations occurs to give a sodium montmorillonite and calcium carbonate. When sodium silicate is added to a sand with a high clay content, it is possible that this type of reaction can occur. Norton[2], whilst discussing clay slips, gives the following reaction:

$$(\text{CLAY OH})_2\text{Ca} + \text{CaSO}_4 + \text{Na}_2\text{SiO}_3 \rightarrow 2(\text{CLAY OH})\text{Ca} + \text{CaSiO}_3 - \text{Na}_2\text{SO}_4$$

If the clay mineral has a low base-exchange tendency then this reaction would not be expected to take place. In fact, in Eastern European countries[3], CO_2 moulding sands with good green-strengths are being used. The clays used are mainly kaolins and secondary-mica groups, which, as is shown in Table 3, have a much lower base-exchange tendency than the montmorillonite group.

TABLE 3.—*Base-exchange Characteristics of Three Clays.*

Clay.	Base-exchange characteristic.
Kaolinite	3—15 Milli equivalents 100 gm.
Montmorillonite	60—100 ,, ,, ,,
Secondary mica	20—40 ,, ,, ,,

After R. E. Grim.[1]

Kelly and Jenny Theory

The difference in the behaviour of the used and new sand, shown in Table 2, may be accounted for by a theory advanced by Kelly and Jenny. This states that, when considering the sheet-like structure of clays, there are excess negative charges at the edges of the sheets which are satisfied by hydrogen ions or exchangeable cations. When clay is ground there is a crystal breakdown which exposes more negative charges to be satisfied by the cations. Applying this theory to the present problem, it would be expected that used sand would react more rapidly than new sand, since it has undergone mechanical and thermal shock that would break down the clay crystals, thus presenting more unsatisfied charges and hence giving a more rapid reaction.

Sodium Carbonate Addition

If a base-exchange reaction is responsible for the effect of clay in a CO_2 sand, then, by treating the sand with a sodium salt before adding the sodium silicate, the reaction will be satisfied, leaving the silicate intact for the hardening reaction. This was accomplished by adding sodium carbonate to the sand mix and milling thoroughly before adding the silicate. Table 4 shows the results obtained by testing the treated sand over a period of 24 hr. A more protracted series of tests showed that the sand was still in good condition six days after mixing. A cross check was arranged by adding an excess of sodium silicate to the normal moulding sand. This showed a similar but less spectacular increase in bench life. These results are shown in Table 5. Several sodium and potassium salts were used with varying degrees of

4.—*Results Obtained from Testing Sand, to which had been added Sodium Carbonate, over a Period of 24 hr.*

Moisture (per cent.)	Green-compression strength (lb. per sq. in.).	Shatter index.	Gassed strength (lb. per sq. in.).	Sand mixture.
4.0	5.1	62.5	—	Basic moulding sand + sodium carbonate.
4.8	6.3	79.5	115.5	Basic moulding sand + sodium carbonate + sodium silicate.
—	—	—	69.0	
4.8	6.8	58	51.0	
4.8	5.4	58	51.0	
4.8	6.2	52.5	48.0	
2.2	7.6	49.6	—	Basic sand.
3.2	5.8	69.5	—	Basic sand + sodium carbonate.
4.1	5.3	81.5	141	Basic sand + sodium carbonate + sodium silicate.
4.1	5.8	83.5	123	
3.8	5.7	79.5	99	
3.8	5.4	77.5	111	
4.1	5.9	77.0	112.5	
4.0	5.9	75.0	109.5	
4.0	6.1	82.0	94.5	
3.8	6.0	74.0	102	

veness. The use of sodium carbonate proved the most efficient and economical. The application of this process to production work has given excellent results. It is essential, however, to segregate the surplus CO_2 moulding sand from the conventional moulding sand, since a reaction occurs producing the powdery sand effect encountered in earlier experiments. This effect makes conventional moulding impossible, although moisture contents and green-strengths are unaffected.

.—*Results of Tests on Sand having an Excess of Sodium Silicate*.

Moisture (per cent.).	Green-compression strength (lb. per sq. in.).	Shatter index.	Gassed strength (lb. per sq. in.).	Sand mixture.
3.1	7.2	56	—	Basic sand.
4.1	6.3	72.5	103.5	Basic sand and sodium silicate (5 per cent).
—	—	—	55.5	
—	—	—	30.0	
4.4	4.9	47.5	Not gassing	

Conclusion

The work carried out led to the following conclusions:

(1) A CO_2 moulding sand with a high green-strength can be obtained once the base-exchange tendency of the clay bond has been overcome.

(2) The sand must be milled, and not prepared in a paddle-type mixer.

(3) Unused CO_2 moulding sand must not be returned to the mill for use as a green moulding sand. Once the CO_2 sand has been hardened, it can then be reclaimed and milled for use as a green sand.

(4) Castings produced in this way are accurate and of good surface finish. Conventional moulding techniques can be used without special precautions, and the production rates will only differ by the actual hardening time.

Acknowledgments

The author wishes to thank his colleagues L. A. Deaville and R. Cooksey for their enthusiasm and industry during the investigation, and to acknowledge permission to publish the paper from the directors of Glacier Metal Company, Limited.

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No Dividend from North British Locomotive

ırman of the North British Locomotive Com- Limited, Glasgow, Mr. Thomas Coughtrie, e vice-chairman, Lord Reith, have warned share- s that they will not receive any dividend this And they may not do so for two or three

statement says there is "a great deal to be o bring North British Locomotive to rights."

for the half-year to July 10, 1959, is £986,567, e value of the company to its equity owners is)2. The statement recalls that there were changes board of directors in June and August. Mr. trie and Lord Reith list five points which they ight have been mentioned at the annual meeting company in May in order to give shareholders ıccurate and adequate" appreciation of the n. They add that the accounts have been uled with the auditors and "stockholders now the worst."

uction is now being concentrated in one works, is is expected to improve efficiency. Even so, mediate improvement in profits to the extent for dividend payments can be looked for.

UK Consortium seeks American Steel-plant Contract

MEECO—the UK manufacturing group, Metallurgical Equipment Export Company, Limited, has offered $44,000,000 in credit to finance construction of a steel plant in New Jersey, US. Negotiations are in progress for the award of contracts by the Phoenix Steel Corporation for the erection of a new oxygen plant with an annual capacity of 800,000 tons.

MEECO is a consortium of manufacturers of steelworks plant and equipment and its members involved in the present project are Davy-United, Limited, Head, Wrightson & Company, Limited, Simon-Carves, Limited, and the Wellman Smith Owen Engineering Corporation, Limited.

There is no question of any special UK Government guarantee. If the contract is agreed the Export Credits Guarantee Department can be expected to grant normal export insurance cover and a bank guarantee which will assure the banks concerned of 90 per cent. of the finance involved. Phoenix is one of the smaller steel producers and is not involved in the present strike. Modification of an indenture to permit an increase in the mortgage and total debt of the company would have to be sought, this requiring a two thirds majority of the bondholders.

American Letter

Gas Porosity in Titanium Castings*

Porosity is a major consideration in any casting process. Experimental castings in titanium produced in the author's department were found to contain considerable gas porosity. An investigation was accordingly conducted to determine the causes of the porosity, and to discover how to eliminate it. Precipitated hydrogen has been frequently postulated as a cause, the theory being that the solubility of hydrogen in titanium decreases abruptly upon solidification, thus precipitating hydrogen. However, no reduction in porosity was observed when vacuum-remelted titanium was cast into non-outgassed machined-graphite moulds. The precipitation theory was therefore discarded.

Chloride-vapour Entrapment

There is a strong tendency towards chloride-vapour entrapment in titanium castings. Titanium sponge generally contains quite large amounts of sodium or magnesium chloride, arising from the original reduction process. Quantities of such chlorides detected were sufficient to give partial pressures of 100 to 200 mm. in the voids in castings immediately after solidification, which result agreed reasonably well with the argon pressure of 250 mm. in the furnace. Titanium is, of course, expected to be highly susceptible to inert-gas entrapment, due to its light weight. Two castings were poured under identical conditions, except that one was enclosed in an argon atmosphere, the other in vacuum. Argon entrapment was quite considerable, which emphasized the need for vacuum melting. Another possible cause of porosity in titanium castings is the entrapment of gases liberated by reaction of the molten titanium with the mould material. There was evidence of this when moulds bonded with silicates or other reactive binders were used.

Expendable Graphite Moulds

Of all the techniques tried during the experiments, only the use of expendable graphite moulds resulted in complete elimination of porosity. This mould material may be processed by standard sand-foundry equipment in the first stages of preparation. A final high-temperature firing should be carried out at temperatures up to 1,600 deg. C. in a vacuum, or 1,600 deg. C. in a reducing atmosphere followed by a vacuum firing at 600 deg. C. There will then be only negligible surface contamination, and excellent surface finishes will be obtained on the cast products. The raw materials necessary for producing expendable graphite moulds are cheap, and can be partially re-used. With regard to properties of cast titanium alloys in comparison with wrought forms, the author considers that tensile and impact properties for the as-cast compare favourably to the wrought product. Castings free from gas porosity are now being produced in the author's department by double-melting and vacuum-casting titanium into expendable graphite moulds.

Cope-side Defects in Steel Castings†

Considerable efforts have been made in the last four years to identify the encrusted non-metallic cope-side defects sometimes found on steel castings. The American Foundrymen's Society has sponsored work at the University of Michigan to identify these, and to determine their origin. From microscopic examina
key feature in the defects appears to be the oc
of the mineral corundum. The structures di
are not merely evidence of Al_2O_3, but of a p
crystallite species. Detailed explanation is
the complete report, to prove that the essentia
of the defect can only occur in the metal as
of deoxidation with aluminium. Corundu
originate in the ladle, as well as in the metal
and later reaction products are formed aro
this agglomerate eventually reaches the cope
and reacts further with silica and metal oxid
report recommends that relief from this defec
be sought in mechanical and metallurgical te
involving investigation of mould-metal reactio
other deoxidation products, and that an inve
of the rate of settling out of these inclusions in t
might also be helpful.

America to adopt Metric System ?

Senator Neuberger has put forward to
Congress a bill which provides for a three-yea
by the Department of Commerce, of the pract
and desirability of adoption of the metric sy
America. This study would review standar
used in science, engineering and industry, an
the advantages, and difficulties, of adopting th
system. The bill has been referred to the Co
on Interstate Foreign Commerce.

Foundry for Dominican Repub

The Dominican Republic shipbuilding and
ing firm of Astilleros Dominicanos, C. por
installed foundry equipment at their Rio Hain
Machinery costing $400,000 (approximately £
has been imported, and three furnaces of 15,
5 tons capacity have already been installed
foundry which has been constructed to allow fo
expansion. A 20-ton overhead crane has al
fitted. It is intended that the company shall
machinery for the Republic's sugar mills as w
full range of products for other industries. Tec
from the German firms of Erwin Dorten and Di
will be assisting the company for a year, and
training Dominican personnel to take over all
tions. It is stated by the firm, which is ba
$6,000,000 (about £2,000,000) of Dominican capi
the only raw material which will have to be i
will be pig-iron. When the foundry is in full pro
it is estimated that there should be a $1,000,00
in annual imports of metal products, but with ex
in demand, this will not affect the volume of tra

Mr JOSEPH LINDSAY, former chief generat
tor of Bruce Peebles & Company, Limited, Edi
died on October 16. One of the pioneering engi
hydro-electricity in Scotland he supervised the
of generators throughout the North of Scotland
Electric Board's area. Mr. Lindsay spent ne
years with the company, joining it as an appre
1910. After the first world war he became a
engineer, carrying out work in Japan, China, an
between 1924 and 1927. He was appointed
plant department chief erection engineer in 19
held this post for 10 years.

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* Abstracted from a paper, by M. L. Torti, published by the American Institute of Mining and Metallurgical Engineers in *the American Journal of Metals*. Mr. Torti is attached to the *National Research* Corporation, Cambridge, Mass.

† Taken from the final report by R. A. Flinn an
Van Vlack (University of Michigan, Ann Arbor)
American Foundrymen's Society (steel division)
committee.

ermal Efficiency
Drying Stoves*

An inefficient stove can jeopardize the foundry manufacturing process. The purpose of baking in a foundry is in essence the increasing of the mechanical strength of naturally-bonded moulding sands, and artificially bonded sands for coremaking, so that they can withstand the casting operation. Stoving has also the additional objective of eliminating moisture and volatile matter, and thereby avoiding the occurrence of blowholes in castings. The stove should be operated under conditions which make for full efficiency. It should, therefore, be easily regulated, and its performance subject to control. Tests and steps to be taken to see that this efficiency is secured are given in what follows.

of all, a test of fuel consumption should be to show up whether the efficiency is good . Normal consumptions for an actual stove en in Table 1, according to whether a stove ating every day, every two or three days, or nce a week, and also according to the fuel tar-oil or coke. These figures are for a which takes a charge of 5 cwt. of moulds not included) per cub. yd. and 1½ cwt. of (chaplets not included) per cub. yd. The charge of a stove should be sufficiently acked to allow the heat of the combustion be properly used, but also so spaced as to circulation of gases. If the figures for the nsumption given in Table 1 are exceeded, odical examination of the conditions should e carried out to improve the efficiency of the to do this the following questions should be ered:—

—*Data Applicable to Foundry Drying Store Operation. (Fuel Consumption in lb. per cub. yd. of Oren Space.)*

Fuel.	Working conditions.	
	Daily.	Every 2 or 3 days, or once a week.
. .. ..	4.2 to 6.6	6.6 to 10.0
. .. ..	6.6 to 10.0	10.0 to 13.3

Search for Improvement

Firebox of Sufficient Capacity?

ally, it is advisable to make sure that the is adequate in relation to the dimensional teristics of the stove served. (It should be in mind that the stove heating power, on e, can be taken as 7,650 cal. per cub. yd. stove. The combustion chamber of r-oil burner should have a volume cal- l on the basis of one cub. yd. per 0 cal. heating potential. Furthermore, to ned correctly, the fuel should be preheated uitably atomized. For coke, with natural iring, it is necessary to have a hearth area square yd. for a combustion of 110 lb. of er hr. In addition, the depth of the fuel bed on the hearth should not exceed ten times the average size of the coke.

Is Combustion Properly Controlled?

The principle of this control is to fix the ratio of the volume of air to that of the fuel used. It can be assumed that a volume of air of from 770 to 1,155 cub. ft. per lb. of coke is required, and from 1,155 to 1,540 cub. ft. per lb. of tar oil. It would therefore be necessary to ensure that the excess of air essential to avoid local overheating in the stove is curbed; if this is not done there is a risk of heavy heat losses in the flue gases. Thus, the excess of air can be lowered in the case where recirculation is used, which permits of economies in this loss.

To ensure that combustion is satisfactory, in the case of tar oil, look at the chimney top. If there is a tendency for black smoke to be given off, this shows that the quantity of air being used is insufficient, or that combustion may have been arrested too soon in a too-low temperature zone. For better results, it is necessary to carry out a gas analysis with an Orsat instrument, with which the CO_2 content can be determined by potash absorption, and unburnt residue determined either by chemical means or by combustion with additional air on a platinum spiral to form secondary CO_2.* Normal values for the CO_2 content will be found to be of the order of 5 per cent. (4 to 7 per cent.) for a non-recirculating stove, and 10 to 12 per cent. (or even lower) for a recirculation stove.

Defective operation of the combustion chamber can be the cause of widespread difficulties. For example, a difficult case arose in a foundry through the appearance of a blowhole type of defect on the surface of certain cored castings. This defect was due to a deposit of incompletely burnt tar-oil on the cores during baking. The imperfect combustion of the tar oil was due to the fact that the steel-sheet combustion chamber had not been lined internally with refractory, which prevented it from reaching a temperature sufficient for the complete combustion of the fuel.

Does the Stove Leak?

Leakiness of the drying chamber directly in-

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slated from an article in *Journal d'Informations Techniques tries de la Fonderie.*

* "Practical Method for the Control of Furnace Atmospheres," *Fonderie*, No. 63, March, 1951.

fluences the efficiency of the stove, and also the uniformity of the interior temperature. Thus, the entry of fresh air, when serious, as for instance under the door, can dilute the combustion gas by increasing flue losses, and so create a cold zone where drying will be imperfect.

With a coke-fired stove, air-tightness influences its performance, and it is best to make certain that the joints of the ash pan door and the entry of the primary air, as well as the joints of the charging door, do close tightly.

On one occasion a fire box (fitted with a reserve supply) with a badly-fitting door was installed so that the flame played upon the apron, obviously involving a great waste of heat and deterioration of the fire box.

Is the Chimney Draught Suitable?

Chimney draught plays an essential part, especially in a natural-draught coke-fired stove, for which the chimney should have an adequate section (about 20 per cent. of the fire-grate surface), and sufficient height (more than 3 ft. above the level of the surrounding buildings). It is also necessary to avoid excessive draught, which causes depression in the stove, thereby facilitating the entry of fresh air; the top of the stove should be under a slight pressure, and it is necessary to limit the zone under negative pressure to the lowest possible level, whilst taking into consideration the efficient functioning of the fire box (a certain amount of negative pressure is necessary for natural-draught furnaces). The pressure/depression plane may be controlled by means of a lighted match passed along the length of a vertical door joint.

In any case, it is necessary to instal a chimney damper, to allow of control throughout the period of stoving. It is desirable also to consider the installation of an inverse flue, by taking the gases to floor level, which makes them take a downward path before their evacuation; by this method a better efficiency, associated with a more even spread of temperature, is obtained.

Is the Temperature Distribution Properly Controlled?

This control is operated by movable slabs placed on the inlet and exit gas flues, as well as by means of dampers situated on the recirculation covers. The general principle is to enlarge the openings in the zones remaining cool, and reduce them in those which are too hot. For core stoves, a preliminary idea of the uniformity of heating can be obtained from the colour attained after stoving by cores placed on test platforms.

Is the Stoving Cycle carried out with Fuel Economy in Mind?

The optimum heating cycle for mould-drying ovens (the time of stoving being 12 to 14 hr., and the depth of drying of the order of 2½-in.) can be defined as follows:

First phase: Raise the temperature to 300 deg. C. in three hr.

Second phase: Maintain the temperature of 300 deg. C. for three hr. (in the case of coke firing the first two phases can be lumped together into one of six hr. giving a progressive rise to 300 deg. C.).

Third phase: Keep the moulds in the stove after shutting off the heat (shut down tar-oil burners, damp down coke-fired grates).

It is wise not to prolong the second phase; the third phase, on the contrary, should be prolonged for as long as possible (at least six hours) to allow of the utilization of the heat accumulated in the already dry sand of the moulds by diffusion inwards (drying right through). There is at the same time an equalization of temperature between various layers of sand which are passing through one of the three phases of drying; so that when the moulds are withdrawn from the stove the risk of cracks due to the existence of an over-heated crust is vastly diminished.

During the third phase of stoving, it is best to shut the chimney completely in the case of tar-oil firing, and partially in the case of coke-fired stoves. This shutting off of the chimney allows drying to proceed actively, in the third phase, through the recuperation of the heat stored in those parts of the moulds which are already dried, or in the stove walls. If some draught was allowed to persist, incoming air would rapidly cool the inside of the stove by removing the heat up the chimney.

Is the Stove Properly Insulated?

It is advantageous, in order to reduce the loss of heat through the brickwork of the stove, to lag the inside of the walls and door with a suitable insulating material. This treatment allows a lower thermal inertia to be obtained, which results in a quicker temperature rise and reduced fuel expenditure. Despite the lower storage of heat in the brickwork, it can be shown experimentally that the cooling of the stove is even slower, because the external losses are likewise greatly reduced. The economy effected in the heating of the brickwork is augmented by the corresponding economy in chimney losses, and together they amount to a fuel saving of at least 20 to 25 per cent.

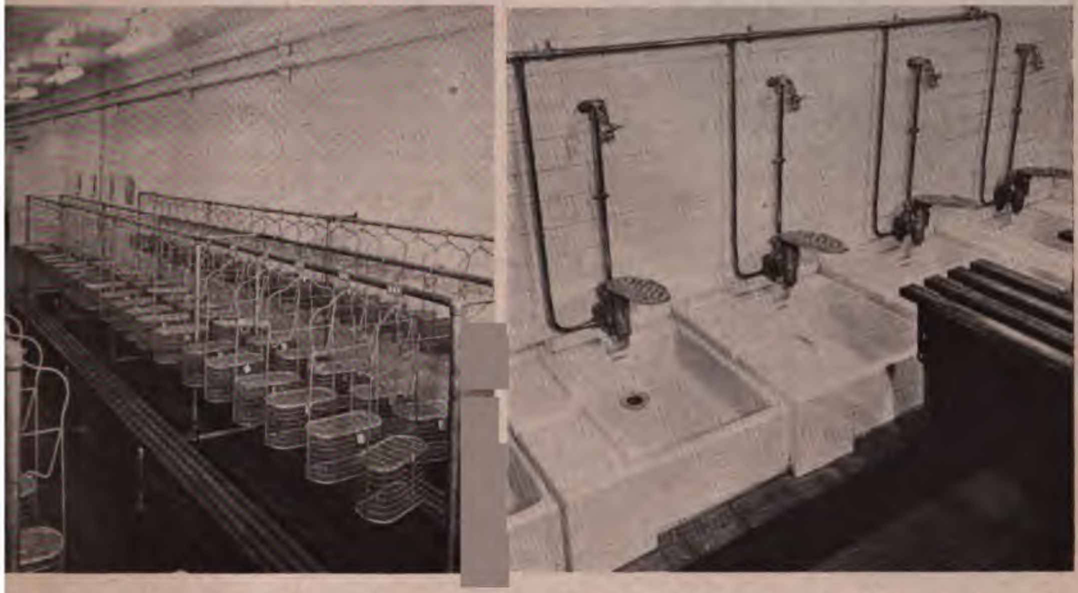
Mr. J. HUGH NEILL, deputy chairman and joint managing director of James Neill & Company, Limited, steel, tools and magnets, Napier Street, Sheffield, left on Friday, October 23, for a six-week tour of Canada, United States, Mexico and the Caribbean. He is visiting agents and customers in Montreal, Toronto, New York, Chicago, Atlanta, Miami, Mexico City, Jamaica and Trinidad. Canada and the United States are now the firm's third and fourth largest export markets, and the company has a wholly-owned subsidiary in New York.

PEL, LIMITED, of Oldbury, Worcester, a member of the Tube Investment Group, is to receive a "super safety" award which will be presented by the Mayor of Oldbury, Councillor Mrs. E. M. J. Gunn, on November 3. Altogether 29 firms have qualified for these awards in this first year of the scheme. To qualify a firm has to have an accident frequency record below the national average for its trade. The accident frequency rate at Pel, Limited, is .79. The Ministry of Labour average for the industry is 1.55.

v Foundry Amenities installed Worthington-Simpson, Limited

foundry amenities and other hygienic equip- ave recently been installed at the Newark of Worthington-Simpson, Limited. The new ent comprises showers, wash-basins, lead- rrors, footbaths, and provision for dirty and lothes safeguarded by padlocks with indi- keys (see Fig. 1). The installation cost , and was designed in consultation with ntatives of the 180 foundry workers for t caters. The rooms are tiled throughout to e hygiene in general and easy washing-down icular. Water is supplied at a controlled ture of 110 deg. F., and no effort has been to ensure that a complete service is offered foundry personnel—there are even sockets ctric razors. Staggered hours permit easy use of the amenities, and a pilot scheme was operated for a few weeks to iron out possible difficulties.

These welfare improvements are augmented by a scheme for the control of dust and fumes in the foundry. The equipment for this was supplied by August, Limited, of Halifax. New sand-mills and sand-storage hoppers with conveyor distribution to the mechanized section have been installed, with fume exhaustion after pouring. After casting, the moulds are moved on a mechanized track to a vibrating knock-out grid with exhaust arrangements. In addition, there is a moving belt to the sand-slinger for the heavy floor-moulding section, the static knock-out also having exhaust facilities.



—Part of the new foundry amenities recently installed at the works of Worthington-Simpson, ed—(left) clothes' baskets, each with individual padlocks, and (right) some of the new footbaths.

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ins's Extension Scheme

is to start soon on a £285,000 extension plan Eastfield factory of F. Perkins, Limited, the rough diesel-engine manufacturers. It will in- e erection of three extra bays at the factory, employs 6,000 people, and is linked with a ment scheme involving additional plant, equip- nd materials handling facilities.

company's managing director, Mr. M. I. , announced that peak production this year more than 400 engines a day, a figure which to 700 next year. Export sales increased by cent. during the first six months of this year ed with 1958, excluding engines produced for Ferguson.

Speed up of Freight Services at Manchester

Following recent reconstruction and modernization, the goods depots of British Railways, London Midland Region, at Ancoats and Ardwick East, are now operating under a new "one-way" system. Traffic previously delivered from the two depots will be concentrated through Ardwick East, and traffic for forwarding will be concentrated through Ancoats. A unified motor fleet will operate for the delivery and collection of traffic.

This "streamlining" of services, with the improved terminal facilities will increase the efficiency in the handling of sundries traffic and will cater for any increase in the tonnage through the two depots. Both depots will be under the control of a goods agent, resident at Ardwick East.

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Eccentric Bellfounders of the Mendips*

By Ronald Bailey

The village of Chew Stoke, lying in a Mendip dale near the Chew Valley Lake (the new Bristol reservoir), was for at least 150 years the home of the Bilbies, a family of bell and clock makers whose name has become legendary in the West Country. The following article records their exceptional achievements, and describes, in a very entertaining manner, their production methods.

The Bilbie family started business in Chew Stoke, a West Country village, in the 17th century, and continued until about the time of Waterloo. The earliest of their church bells, aptly enough, is to be found at Chew Stoke (1698). Bilbie bells are encountered in Bristol, occasionally in Wiltshire, and all over Somerset. Hardly a Mendip village is without one or more of them. Their largest product seems to be the two-ton tenor bell in Yeovil parish church.

In or about 1745 the second Thomas Bilbie, a freeman of Bristol, broke away from the Chew Stoke business to start the West of England Church Bell Foundry at Cullompton, in Devon. He was in business for 42 years, and supplemented his activities with the making of lead snow-boxes, cisterns, pump faces and similar articles, many of which still exist in that neighbourhood. An unverified story tells how the last of the Devon Bilbies destroyed himself on failing to tune a bell to perfection.

In Devon alone there are said to be 350 Bilbie bells. The Cullompton business was sold to the Pannells in 1813, and they continued it until 1855. The last of the bells from the Chew Stoke foundry are at Wedmore and Chew Magna, both in Somerset and dated 1801.

Legends of the Bilbies

Stories of the Bilbies abound in their native village. Tradition has it that they were a queer, eccentric, clannish family, living very much to themselves in almost gypsy fashion. It is said that they let their hair grow lank and long until it was half way down their backs. Whether they practised a lot of mumbo-jumbo nonsense to impress the clergy and churchwardens, or whether they really had trade secrets unknown to others, it is perhaps futile now to argue: but they sedulously surrounded their craft with an aura of mystery, and it cannot be denied that there are tonal qualities in their bells that place them in a class of their own.

Production Preliminaries

When a parish invited the Bilbies to provide a new bell, and especially when an entirely new peal was needed, a member of the family would arrive in the village and settle himself at the inn. He would seemingly loiter around for several days, undertaking nothing more strenuous than an occasional climb to a hill-top. Back in the village inn he would be very weather-wise, talking of the morrow's wind or rain. Then one day he would announce that conditions were just right, and he would ask for the ringers to be at the church before sunrise.

Before daybreak the bell-maker would make for the nearest pond and, no matter whether it was summer or winter, would strip off everything except trousers and boots and wade into the water until it was up to his neck. Standing motionless until the last ripple had died from the pond's surface he would then give a signal to the ringers to peal the existing bells.

Having correctly attuned his ear to the needful peal the bell-maker would return to Chew Stoke and the family would set to work. Sometimes they spent weeks in preparing the metal ingredients and the moulding loam. Calamine, which was plentiful on Mendip, was said to be one of their secrets, while the loam contained clay, dung, hair and "zummat that can't be spoken of."

Casting Rituals

The Bilbies specialized in tenor bells and these, it was asserted, were always cast in tune without the use of tuning forks and with no chiselling away of bits from the sound bow. The bells were cast either at Chew Stoke or in the churchyard below the tower in which they were to hang. But wherever the casting was done, it was not without its ritual. It was always done on a calm night, at a time of full moon, and after the midnight chimes of the church clock had faded away.

The Bilbies did not object to spectators; indeed, they seemed to welcome them, though the need for absolute quiet was insisted upon, and observers were posted along any approach roads to ensure that no cart rumbled noisily upon the scene to upset the texture of the molten metal. The casting process always ended with buckets of water being thrown on the fire—not to put it out, as the Bilbies explained, but so that the fire, for one brief moment, would flare up hotter than ever, and "that's just what we do want."

Traditions

That their talent was something akin to genius no one will deny; and the Bilbies themselves were in no way modest about their achievements. They inscribed their bells with blatant self-advertisements and disparaging allusions to other bellfounders, and the phraseology was often naïvely rustic. For example, at Bruton we encounter:

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* Abstracted from an article, of the same title, which appeared in *Country Life*.

Once I'd a note that no one could bear
But Bilbie made me sweet and clear.

And at Keynsham:

I value not who doth me see
For Thomas Bilbie casted me.
Although my sound it is but small
I can be heard amongst you all.

A story often told at Chew Stoke is about the time when the Bilbie brothers, having put the melting pot on and got everything ready for making the bell, adjourned to the inn. While they were away their sister came out of the house, and, finding the metal just right for casting, poured it into the mould and produced a perfect bell. The brothers, on their return, smashed the bell and re-cast it. "They felt," it is said, "that no woman should have credit for casting a maiden bell."

Brakeshoe's European Interests

By way of its Swiss subsidiary, Brakeshoe International, the American Brake Shoe Company has acquired hydraulics firms in England and Belgium as a first step in establishing European production and marketing facilities for Brakeshoe International. The English company is Deri (Engineers), Limited, manufacturers of industrial hydraulic pumps and motors, of Shoreham-by-Sea (Sussex), and the Belgian firm, Hydrobel, SA, is the largest in its field in that country.

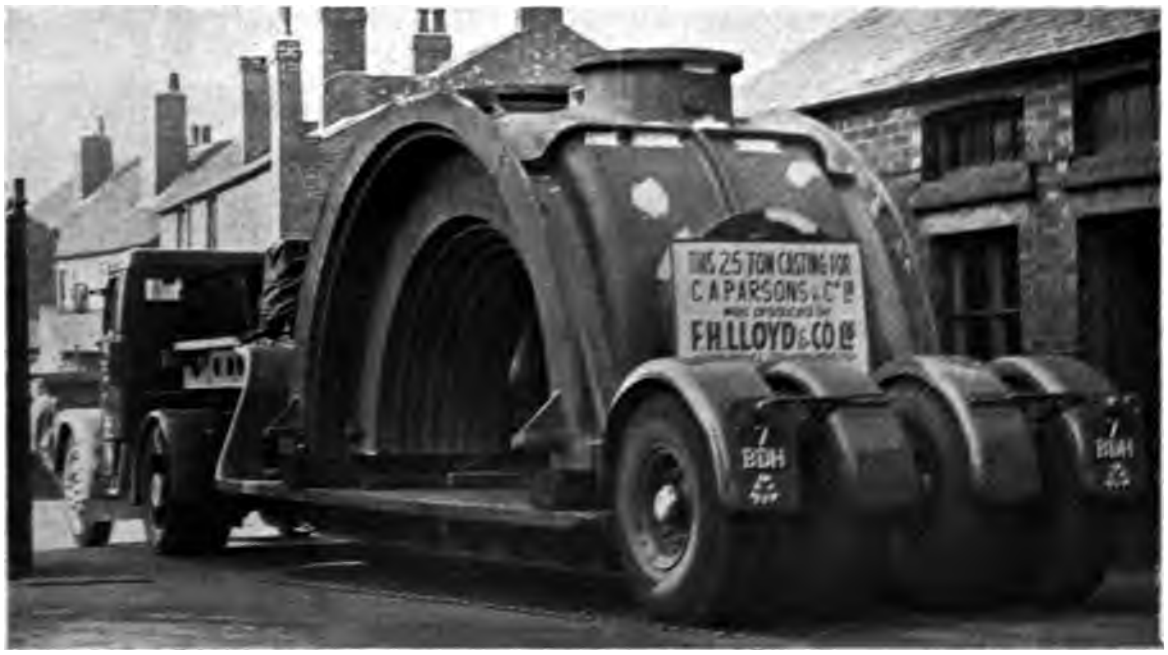
Mr. W. C. Denison, president of Brakeshoe International, said that within four or five years he envisaged a substantial increase in investment and operations, ultimately amounting to several million dollars in Britain and western Europe.

Mr. C. S. Prendergast will continue as managing director of Deri, and the board will include Major J. Fermor-Hesketh and Mr. J. S. Weyman.

F. H. Lloyd "At Home" to Employees

About six months ago, the JOURNAL carried a report on the Open Day of the F. H. Lloyd group of steelfounders, when their Wednesbury foundry and machine shops received visitors from a wide cross-section of industry. In contrast with this, there was held on a Saturday recently, a function at which the firm's employees, their wives and families, were given the freedom of the works. All that was needed was for the visitors to possess a ticket of admission and then they were at complete liberty to wander at will around the shops. It was indeed inspiring to see the pride with which employees conducted parties of their nearest relatives around, showing them their work-places and introducing them to colleagues. Not least, also, it afforded an opportunity for wives to meet their husbands' workmates whom they had perhaps heard discussed many times (maybe in terms of affection or the reverse!) but had never previously met face to face. Refreshments were provided in the works canteen throughout the period and displays of products were on view in the foundry, fettling shops and in the machine-shops. Latecomers, however, missed one of the "star" exhibits, because at 9.30 a.m. this impressive casting (illustrated below) left the works on a low-loader road-vehicle bound for the Newcastle-on-Tyne works of C. A. Parsons & Company, Limited, on the final stage of a long journey which is to end in a Commonwealth power-station.

Large turbine-casing leaving the Wednesbury steel foundry of F. H. Lloyd & Company, Limited en route for C. A. Parsons & Company, Limited, Newcastle-on-Tyne



Equipment and Supplies

Mobile Sandrammer

Foundry Equipment Limited, Linslade Works, Leighton Buzzard, Beds., have produced their largest Sandrammer to date in the Senior No. 4 mobile machine (see Fig. 1 (left)). It is designed to meet the increasing demand for large fully-powered locomotive-type Sandrammers for use with large floor-moulds and pit moulds. The machine is fitted with a 24-in. dia. head, and has a total arm radius of 15 ft. (rear arm 9 ft. plus front arm 6 ft.). Its overall dimensions are: length, 35 ft. 10½ in.; width, 8 ft. 4 in., and height, 15 ft. 1½ in.

Triple-bladed Impeller

The head contains a new type of triple-bladed impellor (see Fig. 1 (right)) covered by British and international patents, and is powered by a 50-h.p. motor at 1,440 r.p.m. (giving a blade-tip speed of 9,050 ft. per min.). The sand output (projected through the head) varies between 1,200 and 2,000 lb. per min. A by-pass plough and chute is fitted, to divert loose unrammed sand on to the pattern before the high-density ramming takes place through the head.

Front and Rear Arms

The front-arm 12-in. belt conveyor feeding the impeller is driven through a gear box from the main impeller drive at a speed of 895 ft. per min. The rear-arm belt feeding the impeller belt is 17 in. wide, and is driven by a separate 3-h.p. motor at 740 ft. per min. Both arms of the Sandrammer are actuated by oil hydraulic torque convertors or "slave units" fed by a double pump driven from a 7½-h.p. motor located at the back of the rear arm. The arm speeds are pre-set by flow-valves located beneath the rear arm, but the speed of both arms can be separately adjusted. The movement of the arms is effected by a control column of unusual design, which contains a "dead man's button." If the pressure on this button is released for any reason whatsoever the control circuit is "killed," and the arms come to rest regardless of any movement of the control column.

Operator's seat

The operator's seat is designed to give protection to his legs, and an adjustable flood-light is fitted just behind the head of the machine to facilitate ramming. The seat can be easily pivoted downwards to give immediate access to the Sandrammer head for checking or maintenance purposes.

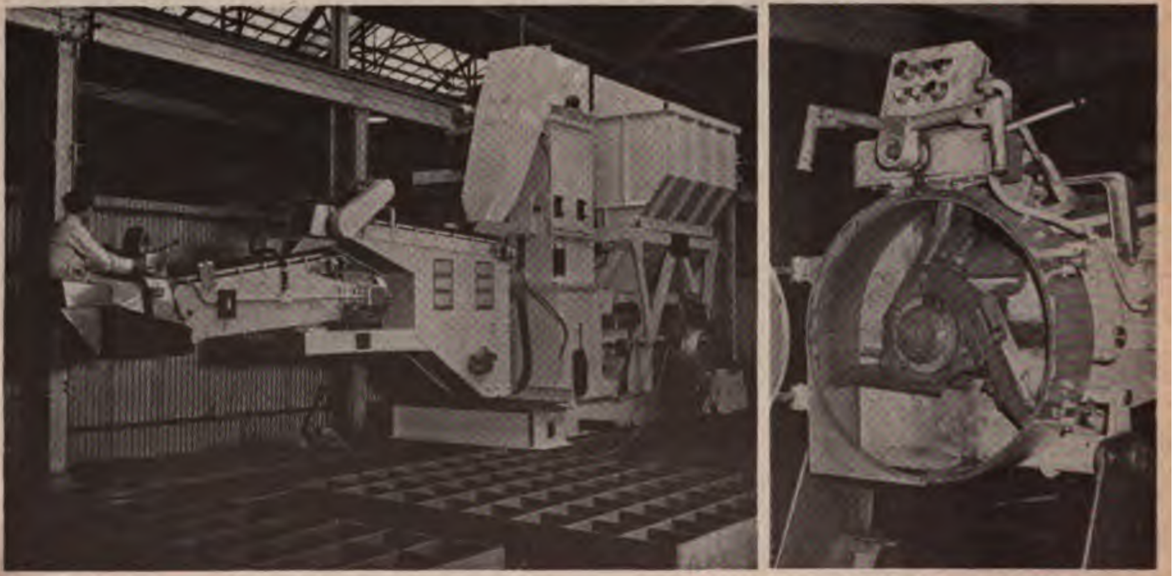
Detachable, and Fixed, Hoppers

The actual mobile unit consists of a removable hopper with a drop bottom, having a capacity of approximately 6 to 7 tons of sand. Underneath the hopper is a 24-in. wide feeder-belt delivering to a 19-in. belt and bucket elevator. The sand feed system has a maximum capacity of 28 ft. per min (equal to approximately 2,000 lb. of sand per min). A permanent magnet is fitted at the head of the rear conveyor-belt to extract the smaller magnetic ferrous inclusions.

The approximate total weight of the complete Sandrammer without sand is 15 to 16 tons. The machine is supplied complete with a spare detachable hopper, although where required it can be supplied with a fixed hopper, for foundries where a direct distribution belt-feed can be brought over the hopper. In practice, however, it is considered advisable to use the detachable system, so that one hopper is being used on the machine whilst the other hopper is being taken by crane to the sand-preparation plant for filling and return.

The machine is supplied complete with self-winding electric cable reel (standard length of cable up to 200 ft.). To ensure safety up and down the track whilst in operation a high-powered hooter is fitted, which is push-button controlled by the operator. All movements of the machine are within easy hand reach of the operator when he is in the control seat. The patented triple-bladed impeller, and special design of the machine, is claimed to ensure the hardest possible balanced "throw" of sand, and reduce vibration to an absolute minimum. The machine is designed for long-term operation under heavy foundry conditions.

FIG. 1.—*(left) Mobile Sandrammer manufactured by Foundry Equipment, Limited, of Leighton Buzzard; (right) the new triple-bladed impeller, powered by a 50-h.p. motor.*



ing Machine: Midgley and Sutcliffe,
dge Works, Leeds, a member of the
600 Group, have added a fully-automatic
ontrolled tracer model to their Richmond
ng machines. The duplex turret milling
ately duplicates negative or positive dies
lustries. Twin Hyspeed heads at a fixed
: with the Hydrotracer in the centre
alves of a mould to be machined simul-
identically.

Rights: Alfred Bullows & Sons, Limited,
Walsall, announce that they have made
with the Gray Company Inc. of Minne-
whereby they have sole distribution
UK for the complete range of Graco
ipment, which includes airless spray-
ment, heavy-material spray and extrusion
d fluid-transfer equipment.

Equipment: Keelavite Hydraulics,
lesley, Coventry, have appointed Holman
Limited, P.O. Box 6218, Johannesburg,
for the sale of hydraulic equipment in
and Rhodesia. Holman Bros. are manu-
raulic cylinders under licence from

ISI Translations

gst the most recently published lists of
vailable from the Iron & Steel Institute
Gardens, London, S.W.1), the following
cted as being of interest to founders. The
is that for single copies, postage extra,
ductions for quantities ordered. Readers
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GRAPHITE FORMATION." Patterson, W., and E.
iesserei, 1957, July, pp. 909-917. (£4 15s.)
speed measurements were made for both
l and transverse waves in test-pieces of cast
differing textural formations. From the dif-
eds recorded it is possible to differentiate
laminar and spheroidal-graphite formation.
same measurements it is possible to make an
ion of the modulus of elasticity in shear
sion, and Poisson's ratio. (Author's summary.)
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llmer, E., *Stahl u. Eisen*, 1959, vol. 79, April
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" Schaaber, O., and R. Chatterjee-Fischer.
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f procedures for determining the quenching
f quenching oils, proposed in Germany and
have been investigated for their suitability
rdization. From the results and considera-
not possible to characterize the quenching
f an oil only by a single numerical value.
different temperature ranges are needed. For
characterization two procedures seem even to
ry, one showing the behaviour on the sur-
one showing that in the core. The austenitic
nd the temperature rise procedures seem to
for standardization. (Author's summary.)

in course of preparation include:—
THE DUST-CONTENT IN INDUSTRIAL GASES AND IN
MEASUREMENTS OF THE DUST DEPOSITED ON THE
Guthmann, K., *Stahl und Eisen*, 1959, vol. 79
6, pp. 1129-1141.
N OF LARGE-DIAMETER PIPES IN THE SEDAN FAC-
HE SOCIETE LORRAINE-ESCAUT." Petit J., *Techn.*
1959, April, pp. 197-206.
SAMPLING AND DETERMINATION OF HYDROGEN IN
Stetter, *Stahl u. Eisen*, 1959, July 23, pp.

News from South Africa

Steelfounding with Zircon Sand

The first metallurgical plant to use power generated from the Zambesi River has been put into operation by Tow Brothers Ironworks, Limited, at Livingstone, adjacent to the Victoria Falls. Power is obtained under off peak conditions at ½d. per unit, with no maximum demand charge, and it is estimated that there is sufficient natural water storage in the upper reaches of the Zambesi to provide a maximum generating capacity in the dry season of 185 megawatts. Under these conditions, and with nearby Wankie coke available, there would seem to be scope for further electro-metallurgical developments in this area.

At the new plant, the first foundry in Northern Rhodesia to produce alloy- and carbon-steel castings, the initial plant installation consists of a two-ton nominal capacity electric-arc furnace for the production of alloy- and carbon-steel castings, and heat-treating plant is made up of pyrometrically-controlled units supplied by the Wellman Smith Owen Company.

An interesting feature is that zircon sand is being used exclusively for moulds and cores. Whilst zircon facings have been used for many years, this is believed to be the first foundry to operate entirely on zircon sand. This was dictated by the circumstances that manganese steel is a major production and that the adjacent Kalahari and Zambesi alluvials, up to the present, have yielded no silica sand of a permeability suitable for steelfounding.

It is anticipated that the use of zircon sand will enable the initial production of 100 tons of saleable castings, in a production cycle comprising moulding, pouring, knock-out, fettling and sand preparation, to be undertaken within an area of only 600 sq. yd. with consequent saving in handling, moulding-box capacity and services. The sand used is being obtained from the Umgababa, Natal, mine of the Anglo-American Corporation and its long life in use and other advantages are expected to off-set its initial cost. Advisor to the project is Mr. A. G. L. Lewis of Meehanite (Africa) (Pty.) Limited.

British Consortium for Power-station Construction

A new consortium of established British companies—Power Construction, Limited—has been formed to design, manufacture, deliver, and construct "packaged" power stations, burning coal or oil, in any part of the world. The members of the consortium are:—

Armfield Hydraulic Engineering Company, Limited, makers of water turbines, water sluice and scour gates, etc., of Ringwood (Hants); Belliss & Morcom, Limited, manufacturers of steam turbines and engines, oil engines, etc., of Birmingham; Cory Bros. & Company, Limited (a member of the Powell-Duffryn, Limited, Group); Lancashire Dynamo Holdings, Limited, holding company of electrical machinery manufacturers, of London, S.W.1, and the Mitchell Engineering Group, Limited, contracting engineers for complete power stations, of Peterborough.

The range of experience and the facilities of its members enables the consortium to offer a comprehensive and completely integrated service embracing all stages from the planning to the commissioning of power stations and, through the combined organizations, has representation in most parts of the world.

The address of the consortium is:—Power Construction, Limited, 19, Berkeley Street, London, W.1 (telephone: GROsvenor 3801/9).

BISRA Open Days

The British Iron & Steel Research Association arranged a special Press showing of their laboratories at Battersea last week, as a preliminary to two Open Days (October 22 and 23) which were designed to show their member-firms and friends in the industry something of the current work in progress. The JOURNAL'S representative was present, and found some of the research being done to be of particular interest to founders.

For example, in the corrosion department, it has been discovered that, although the corrosion rates of ordinary steel and of copper-bearing steel do not differ appreciably when they are totally immersed in sea-water, the corrosion rate may be roughly halved by the addition of 3 per cent. chromium. Tests have also been made on a number of anti-corrosive paints for ships' hulls and steering gear. The initial tests were carried out on small specimens attached to a raft in the Menai Strait, and the best compositions were subsequently tested by service trials on the hulls of several vessels. One of the best compositions was pigmented with basic lead sulphate, aluminium, Burntisland red and barytes, bound with a modified phenol-formaldehyde resin/stand oil/tung oil medium. It has been found that anti-corrosive paints generally fail to adhere to freshly descaled ship-plate, and that a period of weathering to induce a moderate degree of surface rusting is beneficial to adhesion, provided the final wire-brushing is done immediately before painting. Another research feature of interest to founders—in relation to protection of plant and equipment—is that the BISRA corrosion committee and the British paint industry have co-operated to develop new and better priming paints for structural steel. One of the best protective paints has been found to consist of aluminium/basic lead sulphate in alkyd medium. Other research has consisted of field tests on iron and steel pipes, both with and without protective coatings; bare nodular cast-irons, and iron and steel protected by hot-dipped tar and bitumen coatings. A slate-filled coal-tar pitch has proved to be the best protective coating.

Ergonomics and Safety

Much of BISRA's work in ergonomics has been on the design of crane cabs and crane controls. The older type of cab is considered to be unsatisfactory in several respects; the driver has to stand, the controls are big and awkward to operate, there is no protection from heat, dust or fumes and it is difficult to see out. All these problems have been tackled with success. It has been determined that, for ease and accuracy of operation, the handles of master controllers should move in straight lines and should possess "realism," that is, moving a handle should cause the object controlled to move in the same direction. Controllers should be as small as possible, and hence should have the least number of "notches" consistent with adequate control. More use should be made of foot controls. Experiments in BISRA's laboratories have determined the best position for the pivot of a foot pedal. A very interesting discovery has been made from a poll amongst wearers of safety boots. Out of every 100 men asked why they wore safety boots, 67 said "don't know," 16 said "because they are good quality," 9 said "because they are comfortable," and only three said "for reasons of safety." Eye-appeal would therefore seem to be of the utmost importance in persuading personnel to wear these boots!

Management Luncheon in Sheffield

Addressing members of the Sheffield branch of the British Institute of Management at their first luncheon on October 21, Mr. W. H. Higginbotham, chairman of Edgar Allen & Company, Limited, Sheffield, said that "We in Sheffield have tended rather to make a fetish of quality" but that the concern of customers was with "value in use." Over-elaboration he said was not a good selling point; and though the words "made in Sheffield" were a guarantee of quality, they had little effect on the customer if they were applied to an article or product which was, competitively speaking, out of date. He went on to point out that Sheffield was particularly concerned with requirements of users and consumers, mainly industrial, and that long continuance with a successful product and manufacturing policy might lead to bankruptcy. The marvel of to-day, he said, might be the commonplace of to-morrow, and the obsolete of a year hence.

Colonel Sir Frederick Neill, chairman of James Neill & Company (Sheffield), Limited, said capital expenditure had to proceed with great speed if this country were to hold its own. Mr. Alex Dormer, chairman of the Sheffield Twist Drill and Steel Company, Limited, and chairman of the Sheffield branch of the Institute, emphasized the need for improvement of ideas on production and selling.

Speaking about visitors coming to Sheffield, Mr. Higginbotham said that although manufacturers in Sheffield made great efforts to attract visitors, especially from abroad, they were handicapped by inadequate transport facilities, especially air services, and by a lack of sufficient and suitable hotel accommodation. He suggested that Sheffield businessmen might combine to provide a hotel in the city. He went on "I am told that in Düsseldorf in Germany, and in Gothenburg in Sweden, local businessmen faced with a similar problem built their own hotels with conference rooms and other facilities." He added, "It seems absurd—as we so often have to do—to accommodate our visitors, either privately or miles away in Derbyshire, to say nothing of the inconvenience and loss both of time to them and to us. The impression they get is far from good."

Young Engineers' Prospects

The possibilities of promotion in the automobile industry were compared with those in other industries, when Mr. Stanley Markland, O.B.E., works director of Leyland Motors, Limited, and managing director of Albion Motors, Limited, addressed the 16th annual general meeting of Leyland Motors Engineering Society—a society formed to cater for the younger members of the company.

Mr. Markland said that despite the attractions of the atomic and aeronautical industries, which appealed to some young men with high technical qualifications, the automobile industry had still much to offer. In fact the prospects of advancement offered by the automobile industry were as good, if not better, than any other he knew. "The ever-increasing demand for automobiles indicates a period of prosperity and expansion in the industry for generations to come," he said. "There is room for the best brains that we can muster. For those who have the ability, the rewards are amongst the highest."

Sir Henry Spurrier's annual prize of £25 for the best member of the Society during the year was presented to Mr. B. Hindle, a 25-year-old research technician.

s from the Branches

Vorthampton Section

r, members of the Northampton & dist-
f the Institute of British Foundrymen
rks of Crane, Limited, at Nacton Road,
y arrived at 11.0 a.m. and toured the
1.0 p.m., when they were entertained
n the works canteen, after which the
fternoon was spent in the works.

were met by Mr. T. D. Oughton, presi-
ast Anglian branch, and manager of the
ndries, and Mr. R. Y. Peacock, man-
ey-iron foundries. The whole tour was
g and much enjoyed by the visitors.

ny is one of the largest producers in
f malleable pipe-fittings in sizes of from
. Valves, of ¼ to 24-in. dia., are also
ast steel, cast iron and bronze, other
omestic boilers and radiators, and larger
iron boilers for all forms of heating.
ers an extensive area and employs 2,500
nen whilst the foundry alone employs

Grey-iron Foundry

n foundry is laid out in five separate
s which make radiators, small boiler
valve parts up to 18-in. dia. The
nade on special machines peculiar to this
merican origin, whilst the largest boiler
ade on a very efficient slinging machine
power-operated roller-track transfer cars
perated moulding-box pushers were
e foundry is provided with metal from
cupola of 6 tons per hour capacity and
pola of 9 tons per hour, both feeding
It was said that the cold-blast cupola
altered to hot-blast as these two furnaces
very day to produce 250 tons of castings
harging was by a drop-bottom-bucket

able-fittings foundry, batteries of small
ines are used with snap flasks: these
tons per week using metal from a large
a which taps into an electric-arc furnace.
le foundry which has been started up is
developed; this is making fittings and is
electric annealing ovens. A very large
eek of bronze castings is made in the
undry, which the visitors found to be
d of a simple and highly efficient lay-
inimum of mechanization.
p was also well laid out. It was noticed
that a number of the cores were of a
e and of particular interest were the
which are fully vented and carry no
It was said that continuous-drying
t suitable for these because, unless the
us care was paid to core drying, there
gh percentage of scrap.
t of the afternoon was taken up in a
machine-shops and valve and boiler
. It was seen that very fine limits are
tings because a tap has to be inserted
iameter as no prior machining operation
. The automatic-galvanizing shop was
also the pressure-testing department.
ished up in the patternshop and returned
e canteen where the many questions
were dealt with.

Mr. R. Jelley, branch senior vice-president, proposed a vote of thanks to the company, and commented on the open and frank way in which the plant had been shown and questions answered. Mr. Oughton replied on behalf of the firm, and the visitors left for home at 5.0 p.m. after a very full and instructive day.

Slough Section

On September 29, the Slough section of the Institute of British Foundrymen commenced proceedings for their 1959/60 session with a meeting held in the Lecture Theatre of High Duty Alloys, Limited. Mr. S. J. Williams, section president, was unfortunately unable to attend as he was in hospital, so Mr. H. J. Proffitt read a short address from him. In this, Mr. Williams stressed the importance of members attending as many meetings as possible, even if the topic under discussion was not in their own particular field of interest. He also said that wholehearted entering into the discussions which followed the lectures, was one way of understanding what the other fellow was doing or driving at, and he felt that this was the whole essence of Institute meetings. He concluded by saying that he hoped members would not be shy of taking part in the discussions during his term as president. When the preliminaries of the meeting had been dealt with, Mr. Proffitt introduced the lecturer, Mr. H. G. King, of British Railways, Eastleigh, who presented a paper entitled "Introduction to Patternmaking in Plastics."

Mr. King, who is becoming very well known for his knowledge of the use of plastics for patternmaking, gave a very detailed and explicit account of the manufacture of plastic patterns from the master to the complete pattern. Patterns of various types of manufacture were described, and these ranged from the small patterns, solidly cast in epoxy resin, to the larger patterns, and coreboxes which are built up by a system of lamination. The author gave a wealth of information as to the materials and equipment needed to manufacture plastic patterns, and illustrated his paper with a set of excellent slides. He also had on display a number of finished patterns which were made available for examination by members. A very interesting discussion followed the paper, Mr. King being called upon to answer numerous questions.

A vote of thanks to the lecturer for his exceptionally interesting paper was proposed by Mr. Pitcher, who said he had learnt a lot from Mr. King about "the other fellow's job." Mr. Hoesli, who seconded the vote of thanks, wondered if plastics, as well as helping foundrymen to produce castings, were not also causing some embarrassment to them by replacing metal castings for many uses, particularly in the domestic market. He also congratulated Mr. King on the excellent samples he had on display, and said he was amazed at the degree of finish achieved on these.

East Midlands

The first meeting of 1959/60 session (on October 10) of the East Midlands branch was a works visit to G. Perry & Sons, master patternmakers, of Leicester. No fewer than 120 members foregathered to inspect the workshops of the company and the large number of exhibits displayed on the premises for the convenience of members. Most of the visitors were able to see in th course of preparation one or more items for service in their own works. Following the tour of the works, members were entertained to tea by the company, this being taken in the nearby Aylestone Village Hall.

Notes from the Branches

Evening Meeting

Later in the day, Mr. B. N. S. Perry, the new branch president gave his presidential address at the Leicester College of Technology and Commerce, and took as his subject the theme of development in foundries during the history of the Institute of British Foundrymen, with particular reference to the part played by the East Midlands branch.

The speaker for the evening's technical lecture was Mr. H. G. King who spoke on "The Introduction of Patternmaking in Plastics" (see previous page—Editor). A lively discussion followed, to which 21 members enthusiastically contributed, before the meeting was concluded by a vote of thanks proposed by Mr. S. A. Horton, past-president. More than 120 members were present.

South Africa

The South African branch held a social evening at Pharmacy House Auditorium, Johannesburg, during September, under the chairmanship of Mr. K. H. Coombs, the branch president.

During the evening, by courtesy of British Overseas Airways Corporation the following films were shown:—"The Jet Circle," a film of a colourful journey around the world, with touch downs at San Francisco, Hawaii, Tokyo and Hong Kong; "Gateways to Europe," a travelogue in colour of 15 European countries, showing some of the familiar characteristics of each; "Majesty in the Air," which depicted various historical pageants in a variety of settings throughout Britain, and the last film "Everybody's Flying," was an amusing character study of various personalities from different walks of life, during a night flight. There were approximately 150 members, guests and their ladies present at this function, which was concluded by the serving of refreshments by Mrs. I. R. Duncan and Mrs. John Steele.

Works Visit

Members and guests of the branch, spent a most informative and interesting afternoon recently, touring the plant of National Motor Assemblies (Pty.), Limited, near Johannesburg. Rambler, Peugeot, Hillman and Citroen cars are assembled at this plant, which employs a total of 650 European and non-European employees. Seventeen different models of the foregoing units are assembled, and in any one model there are from two to three thousand parts, ranging from fibre washers to plastic hard-tops. The parts arrive in standard-size packing cases from the UK, USA and France, and the cases contain a variety of parts so packed as to utilize the volume to capacity. At present all body and mechanical parts are imported and only tyres and certain upholstery is supplied locally.

After checking, the parts are transferred to the department known as the "materials-handling section," which is responsible for distribution of all parts to the respective divisions. A complete set of small parts such as spark plugs, bolts, etc., is set out on a specially partitioned trolley which has a job identification number. When the engine or body carrying the same number reaches the section for assembly of the small parts, the trolley is set up to follow the unit until all parts have been exhausted.

Procedure

The works are divided into two units known as Plant A and Plant B, and in Plant A, the first division visited by the guests was the cleaning shop where all sheet-metal parts are dipped in cleaning baths to
the protective coating with which they were
for export.

The visitors then inspected the welding sho
the first assembly operation takes place, jigs
ferent colours being used for each car model. F
jig shop the assembled parts are transported b
of a floor conveyor into the body section for
fittings before entering the paint-preparation
ment. All painting, by means of spray guns, is
and there are approximately ten different colou
for all models. Bulk paint mixing is utilized, s
paint being mixed for 200 units.

When the car leaves the paint shop it is tran
to the sound-deadening department for a coa
the inside of the body of a rubber-based cor
which also provides for water proofing. The upl
shop caters for all fittings of this nature in
and, after leaving the trim and mechanical li
body is lowered over the chassis on the finishi
Before coming off this line the car receives
grease, and, prior to inspection, its first su
petrol. Approximately 130 points are checke
inspection department and finally the car is
water test from all angles, by high-velocity j

The production of the factory is approxim
units per day and the visitors were privilege
the first models of the I.D. 19 Citroen co
the assembly line, prior to the official
ceremony by the French Ambassador the
day. The visitors were also shown over th
where mechanics from all over the Union ar
to assemble the new models.

Refreshments were served at the conclusic
visit and the branch president, Mr. K. H.
thanked the company and the plant director,
Edmiston, for their courtesy and hospitalit
occasion.

Wales and Monmouth

The 1959/60 session of the Wales and N
branch opened on Saturday, October 3, with
noon visit to the Newport Works of Black
International, Limited (W. A. Baker section),
being met by Mr. J. C. Wood, foundry mana

The tour of the works, which was con
guides in parties of ten, included the pattern
and steel foundries, and the machine-shop
conclusion of the tour, tea was provide
company, and at this point Mr. R. S. Turn
president, thanked the firm for its generous h
also for its courtesy in arranging the visit. W
said Mr. Turner, were a very important p
Institute's activities, and the W. A. Baker s
been hosts on more than one occasion. N
acknowledged the vote of thanks on beh
directors.

After tea, Mr. B. N. S. Perry presentec
on "Modern Methods in Pattern Production.'
excellent series of lantern slides to illustrate
He subsequently dealt very ably with questic
the discussion which followed.

Mr. Gordon Jones proposed a vote of
Mr. Perry for a most interesting and instructi
and Mr. Stribblehill, a patternmaker himself
pressed his appreciation in seconding the prop
Perry acknowledged the vote of thanks and th
closed.

Mr. C. W. V. Davis, a director of Res
Control Instruments, Limited, will head th
formed industrial products division of the

·Catton's New Foundry

/, October 19, liquid steel flowed for the
n the electric high-frequency furnaces at
Weir Foundries, Limited. It was only
go that the first top soil was removed
: and building commenced on the new
:r 140,000 sq. ft. of the 30-acre site; part
scheduled for industrial development at
Leeds. The close co-operation of officials
horities and Public Services helped con-
bringing about the rapid progress in
plant installation. The programme of
prepared by the architects, Drawing Office
nited; the consultants were R. F. Ottignon
Limited, and contractors included Henry
ıs, Limited, Bradford, Templex Holdings
ıction Company, Limited, Bolton, and
& Company (Leeds), Limited.
has been designed to produce stainless-
cial alloy castings by modern processes,
have been decided having regard to the
techniques developed in the United
ited States and European foundries. Some
quipment of the type not available in
has been imported, with the objective of
undry working conditions and increasing
Of the total building area erected, 50,000
been allocated for centralizing common
the other subsidiary of the group, Catton
Limited, steelfounders, Hunslet, Leeds,
ny has developed rapidly in recent years
ısequent utilization of all its available
emphasis on future development at
will be to satisfy the requirements of the
ındustry for high-quality precision-made

'orks will be operated by Weir Foundries,
vholly-owned subsidiary of Weir-Catton,
board of which consists of Lord Weir
Mr. J. W. Atwell, Mr. S. L. Finch,
ector, Mr. F. J. B. Henderson, Mr. J. R.
/. H. Morton, sales director, and Mr. S.
ancial director.

ron and Steel Institute

tation of the Council of the University of
V. Kurdjumov, director of the department
ıphy and metal physics, Central Research
Ferrous Metallurgy, Moscow, will deliver
Hatfield Memorial Lecture. He will take
t "Phenomena occurring in Steels during
nd Tempering," and the lecture will be
dnesday, November 25, at 6.30 p.m. in the
f Sheffield University.

ın annual general meeting of the Iron and
e will be held in London on Wednesday
ıy, December 2 and 3. The technical
ıe of which will run simultaneously, will
e Great Hall, Caxton Hall, London, S.W.1
Hoare Memorial Hall, Great Smith Street,
/.1. The sessions will be divided in five
Session A: Forging; session B: extrusion;
ıming in steelmaking furnaces; session D:
nitrides in steels; session E: controlled
ɔn, and session F: tempering of steels.
ınd B will be held in Caxton Hall, and
), E and F, in the Hoare Memorial Hall.
vening of Wednesday, December 2, Mr.
umov will lecture on "Martensitic Trans-
in Metals and Alloys" in the Hoare
all, commencing at 6.30 p.m.

BCIRA Lectures on Cast Iron for Engineering

The British Cast Iron Research Association are holding a series of lectures in Glasgow on the use of cast iron for engineering purposes. The lecture programme has been organized in conjunction with the metallurgy department, Royal College of Science and Technology in Glasgow, where the lectures are being held. All the lecturers, with one exception, will be members of the staff of the BCIRA. The purpose of the lectures is to instruct or re-inform the engineer and designer on the metallurgy and properties of cast irons, and to indicate correct principles of design from the aspect of both the foundryman and the user of the casting. Of the 14 lectures included in the programme —and being delivered at 2.15 and 4 p.m.—the 12 remaining are being given on October 29, November 5, November 12, November 19, November 26 and December 3. (The first two lectures of the series were presented on October 22). Practically every aspect of the use of cast iron is included, from the stress/strain properties of cast iron, mechanical properties of malleable iron, influence of alloying elements, corrosion of cast iron, to the design of castings for production and the use of specifications. Enrolment forms for the course of lectures and further details can be obtained from the secretary, Royal College of Science and Technology, Glasgow, C.1, the fee for the course being £3 3s.

National Foundry Craft Training Centre

Below are given the opening and closing dates of the courses for 1960, arranged by the management committee of the National Foundry Craft Training Centre, West Bromwich. Some will take place at the Training Centre and others, by agreement with the Stanton Ironworks Company, Limited, at that company's Training Centre, near Nottingham.

Opening date.	Closing date.	At NFCTC centre.		At Stanton.	
		Term.	Course.	Term.	Course.
1959 December 28 ..	1960 January 21 ..	119	4th	119S	2nd
1960 January 25 ..	February 18 ..	120	3rd	120S	2nd
February 22 ..	March 17 ..	121	1st	121S	2nd
March 21 ..	April 14 ..	122	3rd	122S	2nd
Easter: April 15 *to* 19					
April 20 ..	May 13	123	1st	123S	2nd
May 30	June 23 ..	124	1st	—	—
Whitsun: Monday, June 6					
June 27 ..	July 22 ..	125	4th	—	—
August 22 ..	September 16 ..	126	3rd	—	—
September 19 ..	October 14 ..	127	1st	127S	2nd
October 24 ..	November 18 ..	128	4th	128S	2nd
November 28 ..	December 23 ..	129	3rd	129S	2nd

ACCEPTING THE ADVICE of the executive of their union, the Amalgamated Union of Foundry Workers, 240 employees at the Tollcross (Glasgow) works of Stewarts & Lloyds, Limited, decided at Coatbridge last week to end their dispute with the firm. The men came out on strike when 25 workers were declared redundant. They remained out for four weeks and returned to work a fortnight ago on the advice of their union. The Coatbridge meeting was described by Mr. Robert Garland, national organizer of the union, as "somewhat stormy."

News in Brief

British Railways (Scottish Region) have placed a contract with the Butler Machine Tool Company, Limited, Halifax, for the provision of two rail-planing machines for Motherwell permanent workshops.

Horseley Bridge and Thomas Piggott, Limited, held their first long-service awards presentation ceremony on October 15 when 157 employees, 13 of them with more than 50 years' service and 144 with over 25 years' service, received gold watches.

The Brightside Foundry and Engineering Company, Limited, reports in the Brightside group's magazine, that the demand for rolls from the home market is on the increase and that there are substantial export orders from India, Australia, Norway and Canada.

Small & Parkes, Limited, announce that they have installed TeLEX at their registered offices and works, Hendham Vale, Manchester, 9, and at their London office, 251, Kingston Road, S.W.19. The numbers are:—Manchester TeLEX 66161 and London TeLEX 25439.

The activities of the United Coke and Chemicals Company, Limited, Orgreave (a branch of the United Steel Companies, Limited), will be featured in a 15-minute film now being made by Wallace Productions of London. It is due to be completed by next spring.

The only one of its kind in the UK, a 26-ton soil stabilizer is being shipped to Persia to work on the £850,000 Khorramshahr Bridge contract being undertaken by the Cementation Company, Limited, London, S.E.11. The machine, which is more than 30-ft. long, is used for road and airfield runway construction.

Work on harbour construction at Rota—the United States Naval Base in Spain—is nearing completion and a contract has been awarded to a British firm, George Cohen Sons & Company, Limited (a member of the 600 Group of Companies) for the disposal of the $3,000,000 plant used in construction.

As a result of a very considerable increase in turnover on hire-purchase sales and the growing requirement for such services at the lowest possible rates, the British Wagon Company, Limited, in conjunction with Massey-Ferguson (Great Britain), Limited, has reduced the retail rates in the UK under the Massey-Ferguson Pay-As-You-Farm plan.

At a meeting of the Council of Wolverhampton Chamber of Commerce on October 19, the president of the Chamber, Mr. D. C. Jemmett, reported far more buoyancy in the steel trade particularly since the general election. Mr. Jemmett said that there had been a recent change in the trend of trade in the area. Labour was still difficult to recruit.

Two of the larger West German steel concerns—Deutsche Edelstahlwerke, AG, of Krefeld, and August Thyssen-Hütte, AG—are to strengthen technical co-operation by the appointment to the Edelstahlwerke board of Thyssen director, Dr. Walter Cordes, and another Thyssen director, Dr. Alfred Michel, to the Edelstahlwerke board of administration.

It is reported that the 200 strikers at the Milford foundry of Glow-Worm Boilers, Limited, Derbyshire, who walked out on October 21 in protest against the employment of a 25-year-old Punjabi, have now returned to work. The strikers claimed that the manage- nt had failed to honour an agreement not to take on her coloured labour if white labour were available.

Newcastle-upon-Tyne City Health Committee, which complained to Vickers-Armstrongs (Engineers), Limited, about the fumes from its Elswick foundry, has been informed by the company that the cost of installing and maintaining equipment to deal with the fumes would be prohibitive. The committee is to reconsider the position after talks with the alkali inspector.

A new company, Industrial & Transport Equipment, Limited, has been formed jointly by the General Electric Company, Limited, and Leyland Motors, Limited. Initial capital will be £50,000 in 200,000 ordinary shares of 5s. each. Its object is to take over an existing company, Consolidated Near East, Limited, in which both companies have shared an interest for nearly 30 years.

Buckley and Taylor, Limited, of the Brightside group, is to supply for an oil company a large distillation plant. In terms of gross output it is said to be the largest in the world, weighing over 400 tons with each of the eight condensers containing over 10 miles of tubes. The firm is also to supply four large heat-exchangers to the new Hinckley Point atomic power-station.

The British Coke Research Association's Wingerworth research centre, Chesterfield, was on view to the public on October 17 for the first time since it was officially opened by the Duke of Edinburgh in November of last year. Local residents who had complained about pollution from the NCB carbonization plant alongside, were able to see researchers at work on devising methods of eliminating pollution from all such plants.

A subsidiary of Associated Electrical Industries, Limited, Birlec-Efco (Melting), Limited, has acquired a 50 per cent. interest in Efco-Lindberg, a Canadian manufacturer of industrial furnaces. As a result of the move the Canadian company has been re-named Birlefco Lindberg. It will manufacture the complete range of Birlec-Efco and Lindberg melting and heat-treatment furnaces and atmosphere generators at its Toronto plant.

A new agreement between the compressor division of Demag, A.G., Duisberg, West Germany, and William H. Capper & Company, Limited, Warrington (Lancs), appoints the British firm sole representative in the UK for the sale of all the products of the German company's compressor division. They include reciprocating, turbo- and axial-flow and rotary compressors, centrifugal blowers, and a wide range of mining equipment.

Another order for Ruston locomotives has been received by Ruston & Hornsby, Limited, Lincoln, from Colvilles, Limited. It is for 12 Mark 165DE, 150 b.h.p., 28-ton, 0-4-0 diesel-electric units, arranged for single or tandem operation. Five are for Colvilles' Dalzell Works, four for the Glengarnock Works, and three for the Lanarkshire Steel Works. The number of Ruston diesel-electric locomotives ordered by Colvilles since January, 1953, is now 42.

A licensee agreement between W. H. Allen, Sons & Company, Limited, Bedford, and the Elsinore Shipbuilding & Engineering Company, Denmark, covers the construction of three 720-kw, C.M.R. turbo-alternators for a passenger vessel under construction at Elsinore. The turbines, gears, and condensing plant will be built at the Elsinore yard to the designs and drawings of the Bedford company, which will also supply certain parts for the turbines and gears. The alternators will be of Danish manufacture.

NG for the lighting and power installa-
banana warehouse for Elders & Fyffes,
British Railways goods yard, Barlby
ensington, London, was provided by
Callender's Cables, Limited. Poly-
p.v.c. sheathed cables with watertight
ng are used in the ripening rooms, to
erioration in conditions of extreme
gh temperature.

RAULIC EQUIPMENT MANUFACTURERS
eir own association—the Association
uipment Manufacturers—to meet the
ral organization to look after the in-
dustry as a whole; to collect and dis-
information; to advise on exhibitions;
ge and to sponsor research for the
pers. The offices of the Association
ccleston Square, London, S.W.1.

& COMPANY, LIMITED, have opened
ice premises and works extensions at
Works, Motherwell, at a cost of
on the site of a two-storey tenement.
oor block contains the general office,
nd filing accommodation. A circular
gives access to all floors. The works
s of a 100 by 50 ft. addition to Bay
ne rails to permit of it being used in
the existing shop.

TO INCREASE the number of first-class
cientists for the power industry, the
industry is to offer 61 university
grammar and public school pupils.
will be valid for three years and
50 at Oxford and Cambridge and £400
dates are expected to train in industry
before going to the university and to
st two years afterwards. The scholar-
n to candidates of both sexes.

BAILEY, managing director of Charles
pany, Limited, railway-wagon builders,
n, near Wakefield, has dismissed as
rumours of possible short-time and
the works. He admitted that as a
sh Railways' policy to meet their own
own wagon shops, the firm was not
ny further orders from that source.
d the company had just obtained a
wagons for the New Zealand Govern-
and had also received another sub-
tankers from a petroleum company.
ient orders on the books to keep the
pied in most departments for at least

AM AND DISTRICT INDUSTRIAL SAFETY
ne-day conference in Birmingham, on
liscuss safety training, when Mr. W.
anagement consultant firm of Urwick
, told delegates that about 20,000,000
ear were lost to British industry as a
accidents. He suggested that execu-
a new lead in training inside the
t there should be full-time appoint-
personnel. Managements, he said,
ake considerable savings in produc-
ccident frequency were reduced. The
cident when it included such items as
s and production downtime, amoun-
as four times the cost of the pay
operatives away from their jobs.
accidents were given to delegates by
, chief safety officer of Wall Paper
imited, who said that the number of accidents reported to HM Inspectors of Factories last year was 168,000, with fatal accidents numbering 665. On average about 60,000 workers were absent from their jobs every day because of injuries sustained in accidents. Mr. Jepson also urged that training programmes be intensified in factories where industrial accident frequency could be lowered by an intensive campaign.

Obituary

Mr. L. H. **JOSLIN**, who died last week, was assistant commercial officer (mineral) of the Eastern Region of British Railways at the headquarters at Liverpool Street.

The death has occurred of Mr. E. W. F. **HALL-CRAGGS**, M.A., A.M.I.C.E., M.I.B.F. He was managing director of Gascoignes Non-Ferrous Foundries, Limited, of Slough, and died in his 64th year.

Mr. **ALEX. HUTCHISON** of A. Hutchison & Son, Limited, bath manufacturers of Bow, London, died on October 24. At 83, Mr. Hutchison was still senior director of the firm (founded by his father in 1882), which he joined at the age of 15.

The death has occurred of Mr. **JOHN R. WILDER**, general manager for more than 27 years of the Willenhall and Wednesfield (Staffs) works of the Yale & Towne Manufacturing Company, manufacturers of locks and materials handling plant, etc. Mr. Wilder was 74.

Board Changes

BLYTHSWOOD SHIPBUILDING COMPANY, LIMITED—Mr. A. G. Bain has been appointed to the board.

JOHN THOMPSON, LIMITED—Mr. Airey Neave, M.P., has been appointed a member of the main board.

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE COMPANY, LIMITED—Mr. R. A. Erskine has joined the board.

ATOMIC POWER CONSTRUCTIONS, LIMITED—Mr. J. W. Ashley, chief engineer, has been elected to the board as technical director.

UNION STEEL CORPORATION (OF SOUTH AFRICA), LIMITED—Mr. E. P. Smith has resigned from the board and Mr. R. C. Elliott has withdrawn as his alternate.

ACHESON COLLOIDS, LIMITED—Mr. Edward A. Smith, executive manager of the parent company, Acheson Industries (Europe), Limited, has been appointed to the board.

BRITISH METAL CORPORATION, LIMITED—Field-Marshal Sir Gerald Templer has been appointed a director and elected chairman of the company, which is a subsidiary of the Amalgamated Metal Corporation, Limited. Mr. A. J. Hugh Smith has resigned as chairman on account of advancing years, but he will remain on the board. Sir Gerald is to be elected a director of the Amalgamated Metal Corporation in November.

Mr. E. **MORGAN**, general manager in charge of research, the Stanton Ironworks Company, Limited, has been appointed as one of the two representatives of the Joint Iron Council on the Iron and Steel Industry Standards Committee of the British Standards Institution. Mr. Morgan will also represent the Council of Iron Producers. He succeeds Mr. G. H. **JOHNSON** who has resigned from the Committee after several years' service.

Raw Material Markets

Iron and Steel

Total number of furnaces now in blast is approximately 80, compared with about 86 at this time last year, but overall productive capacity has not declined comparatively, as the furnaces now producing are mostly new and larger units or have been modernized. Outputs of pig-iron at many of these furnaces are below capacity levels and could be increased to meet larger demands. A number of furnaces are still out of blast due to the moderate demand for the grades of pig-iron they normally produce.

Of the total current production of pig-iron basic steelmaking pig-iron absorbs the greater proportion. Larger quantities are now being supplied to steelworks to meet increased consumption rates, but available supplies are ample and more can be supplied when needed. The high percentage of scrap used by the steelworks reduces the amount of pig-iron in their mixtures.

In the foundry grades of pig-iron, producers report an improved demand; more pronounced for some types than others. For low-phosphorus pig-iron the market continues to expand appreciably and, although several brands are now available to the engineering and speciality foundries, some producers are heavily committed and fresh business is being declined at present. Overall production, however, should be adequate to meet the need for some time ahead.

There is also a growing demand for hematite from the engineering and speciality foundries and the needs of the steelworks for increased quantities of ingot moulds and castings have also stepped up demands. The improved call for high-phosphorus pig-iron is maintained, but there are still tonnages to spare and the furnaces hold appreciable amounts in stock. Refined iron makers are also sharing in the improved demands, but would have no difficulty in undertaking fresh business.

Those foundries supplying castings to the motor vehicle trade continue very busy, and demands from that trade are substantial, with current schedules showing an increase. The machine-tool industry is taking up a larger tonnage of castings, and many other trades are also calling for fairly good tonnages, so that the foundries supplying can obtain reasonable outputs. There is only a moderate call from the collieries and railways, and the light-castings trade could undertake much more business, although those supplying castings to the domestic utensil trade are getting more business which it is hoped will expand even further in the near future.

Scrap supplies to the foundries are in the main satisfactory. Foundry coke deliveries are adequate, and ganister, limestone, and firebricks are easy.

The re-rollers maintain an improved rate of production and demands for small bars and light sections are at a high level. There is a heavy call for reinforcing rods.

The steelworks are sending forward to the re-rollers all available supplies of billets, and orders at present on hand are more than sufficient to absorb current outputs. Fresh business can only be accepted for deferred delivery. The steelworks have no difficulty in disposing of all arisings of suitable re-rolling defectives and crops.

Non-ferrous Metals

Copper has been a strong market in London and at one point last week it was traded in at up to £264 a ton. The outlook is still good and there is no reason
why the price should not continue its upwar
Indeed, with supplies of metal for early delive
and demand coming in from the US. Europe
and Russia, there seems little in the way of
continuing its upward surge. In fact, the over
tion is becoming a little desperate as the US
industry is still idle and a settlement is no
sight, while, in Chile, negotiations between the
Company and the striking union have been su
indefinitely. More than that, the only US
smelter that has any metal for sale is America
Climax, so that there is no quoted price
customs smelters in New York. For deliver
the end of the year US consumers are paying
a pound, equivalent to £292 a ton.

The London market is strong, although i
tivity was well displayed at the beginning of t
when it was rumoured that the US Governme
release copper from the stockpile. This led
reaction and profit taking. But since then t
been an official denial that stockpile copper
released and the price has gone ahead again.
is still concentrated on nearby metal and the
for cash over three months is now £17 10s. a

The drain on available supplies in Lon
again reflected in the drop in stocks held in LM
houses, which fell 993 tons to 9,450 tons at t
last week.

Zinc continues to be a good market, with
going ahead strongly. Last week the Londo
tion gained £3 10s. a ton and current metal
not far short of £100 a ton. As in copper, d
concentrated on prompt metal, which is sca
the backwardation is £5 a ton. In these
stances it was not surprising that the US
was raised in two stages to 14½ cents a pou
York, and advanced 1 cent to 13 cents a po
St. Louis. However, following the news
resumption of work in the US steel mills
postponed, the New York quotation droppe
to 14 cents a pound and "Prime Western"
Louis basis, is now quoted as a split price
cents a pound. Trading activity in Londo
and prospects are that the price will reach £
when the inevitable court order is promulgat
the steelmen back to the mills.

Lead is quiet in the US, but is experie
conditions in London. This is partially
sympathetic movement with zinc. In the US
is unchanged at 13 cents a pound.

Tin remains unmoved by the internatio
disputes and price has remained remarka
In London it is holding steady at around
and in the US it is not far short of $1.02 a

* * *

THOMPSON MINE in Northern Manitoba,
second largest nickel-producing project,
rapidly towards completion, Dr. John F.
chairman of the International Nickel Co
Canada, Limited, said in London on Octob
unit is scheduled to start its breaking-in p
next year; production at an annual rate of
is planned. The new town of Thompson, n
the company's chairman, will initially prov
for 8,000 people. The mine, developed at
£3,500,000, will be second in size to Inco's
in the Sudbury district of Ontario. In
Canada's combined annual production cap
its operations in Sudbury and in Manito
172,000 tons. The Western world attained a
in annual nickel production capacity in
mated at 234,000 tons.

ompany News

s and John Dale Terms

ıow been agreed for the proposed merger
l Closures, Limited, West Bromwich
John Dale, Limited, makers of non-
sible tubes, aluminium and light-alloy
of London, N.11. The offer is seven
4s. ordinary shares for every six John
shares and 280 Metal Closures 5s.
100 nominal John Dale unsecured loan
erms would give present Metal Closures
cent. and John Dale holders 47 per cent.
ed equity.
becomes unconditional both companies
n dividends of 11 per cent. and a final
is then foreshadowed on Metal Closures
eased to 7,075,000 shares by full accep-
almost exactly in line with the contri-
ı to the group profits on the basis of
stimate of combined profits, before tax,
ctors of John Dale unanimously recom-
holders to accept the offer and if it
ditional they have undertaken not to
ures ordinary for at least three months.
eed to accept and have stated that they
nt intention of selling. The offer is
ember 3 or not later than November 17.
ger is effected three Metal Closures
in the John Dale board, three of whose
join the Metal Closures board. An
meeting to consider increasing the
held on November 4.
Winterbottom Industries, Limited, had
John Dale ordinary and £228 per £100
and holders have the two offers to

BLES (SOUTH AFRICA), LIMITED—Dividend
nded June 30, 1959, is cut to 10 (12½)
rading profits contracted to £134,724
after tax of £32,000 (£43,200) the net
at £73,836 (£99,169).

FOUNDRY & ENGINEERING COMPANY,
final dividend is raised to 12½ (11) per
17½ (16) per cent. for the year ended
After lower tax of £19,428 (£26,268)
up at £23,298 (£19,290).

DER & ACHURCH, LIMITED, lift and pump
tc., of Birmingham—The company has
ntire share capital of the Willen Key &
pany, Limited, hardware manufacturers,
n, E.C.1, together with its subsidiaries.

CHAMBERS, LIMITED, engineers, copper-
unders, and pewterers, etc., of Birming-
rim of 5 (3½ per cent. equivalent) is
the directors point out that the increase
on to final distribution. Trading results
indicate that the total for the year is
creased.

& ENGINEERING COMPANY, LIMITED—
sumed with the payment of 4 per cent.
ingle payment of 6 per cent. was made
there was no dividend for 1957. The
that the general upward trend referred
report has continued and, coupled with
ciency of the organization, has resulted
rofits.

HERHOOD, LIMITED, engineers and iron-
terborough—A final dividend of 20 per
per cent. on capital increased by a 50 per cent. scrip issue for the year to March 31, 1959. This is an effective rise of 2½ per cent. over the previous total, which included a special bonus equivalent to 6⅝ per cent. Profits were £530,204 (£532,758) and after tax of £250,000 (£292,250) the balance is higher at £280,204 (£240,508).

WALMSLEY (BURY) GROUP, LIMITED, manufacturers of pulp and papermaking machinery, etc., of Bury (Lancs)—The distribution is being effectively raised by 3½ per cent. to 20 per cent. for the year to June 30, 1959, with a 15 per cent. final. The 1957-58 total of 32½ per cent., prior to the one-for-one scrip issue, included a bonus of 5 per cent. Group profit is £832,501 (£888,317); after tax of £412,950 (£458,538) the net profit is £419,551 (£429,779).

BRUSH ELECTRICAL ENGINEERING COMPANY, LIMITED—The company, which is a member of the Hawker Siddeley Group, Limited, has acquired the motor business of Veritys, Limited, the Birmingham manufacturing electrical engineers, which is in voluntary liquidation, and also the issued share capital of a small company, Althea Electric, Limited, which is represented by two shares of 1s. out of a total authorized capital of £100 in shares of 1s.

HILGER & WATTS, LIMITED, manufacturers of scientific instruments, of London, N.W.1—The company has acquired for 26,000 ordinary 5s. shares the issued share capital of Infra-Red Development, Limited, Welwyn Garden City (Herts). This company specializes in instruments for non-dispersive infra-red gas analysis, a field which will be complementary to the dispersive techniques used by Hilger & Watts. Mr. W. B. Bartley is retained as managing director.

JOSIAH PARKES & SONS, LIMITED, non-ferrous founders and manufacturers of locks, etc., of Willenhall (Staffs)—In their interim report the directors state that during the period since January 1 last output has shown "a very satisfactory increase" over the corresponding period last year and the intake of orders is continuing at a high rate. Group profits are at a higher rate than last year and present indications suggest that the results for 1959 will be "entirely satisfactory."

NEEPSEND STEEL & TOOL CORPORATION, LIMITED—Holders of the 6 per cent. participating preference again receive the maximum 4 per cent. additional dividend. The ordinary dividend is maintained on the £1,019,249 capital with an unchanged 37½ per cent. final for the year to March 31, 1959, and a one-for-four scrip issue is proposed. Consolidated trading profit, after depreciation, is £1,171,742 (£1,339,299) and the net profit, after tax, is £604,371 (£615,046).

STOTHERT & PITT, LIMITED, engineers and ironfounders, etc., of Bath—Final dividend of 15 per cent. is being paid, making 20 per cent. for the year ended June 30, 1959, on a capital increased to £2,000,000 by a one-for-three scrip issue. A year ago there were three payments and the total was equivalent to 18¾ per cent. Group profits are down to £911,060, (£1,024,422), but owing to a lower tax charge of £412,200 (£531,250) the net profit is higher at £498,860 (£493,172).

MODERN ENGINEERING MACHINE TOOLS, LIMITED—There is to be a scrip issue of one £1 7½ per cent. cumulative preference share for every 10 5s. ordinary. A change in the company's name has been approved—to Modern Engineering Developments, Limited. Mr. P. R. V. Wheeler, chairman, states that the results to date in the current year are well in excess of those to the same date last year. There is every prospect that this year will be what he hopes shareholders will regard as "their second year of reward."

Personal

Mr. J. H. Shelmerdine has been appointed commercial manager of Brown Bayley Steels, Limited, Sheffield.

Mr. D. K. Fraser, managing director of Petters, Limited, is to join the board of G. A. Harvey & Company (London), Limited.

Employed in the foundry and furnace department at the Holwell Ironworks, Leicestershire, for 47 years, Mr. C. H. Simmonds has now retired.

Lord Baillieu, president of the Dunlop Rubber Company, Limited, has been elected as the first president of the British Institute of Management.

Mr. Peter Lowe has been appointed sales manager of the Coleman-Wallwork Company, Limited, and will be responsible for all aspects of foundry supplies.

Mr. E. Wilson has retired from the post of senior foreign correspondent of Edgar Allen & Company, Limited, Sheffield, after 52 years with the firm.

Mr. Denis G. Flather, managing director of W. T. Flather, Limited, steelmakers, Sheffield, will drive his 1897 Daimler in the London to Brighton rally on November 1.

Mr. L. H. Cleaver, who represents the Yardley division of Birmingham in the new Parliament is a partner in the firm of Heathcote and Coleman, secretaries for a number of foundry employers associations.

Sir Gordon Russell will assume the presidency of the Design and Industries Association following his retirement from the directorship of the Council of Industrial Design at the end of this year.

Mr. Harry Wilson, secretary of the Sheffield branch of the Amalgamated Union of Foundry Workers, left on October 24, with other union officials, for an 18-day visit to Moscow and other Soviet cities.

Mr. L. J. Sinden has been appointed deputy sales director of the domestic appliances division of Allied Ironfounders, Limited, Brook Street, London, W.1, and Mr. K. F. Stone has been made sales manager.

The Pressed Steel Company, Limited, announces that Mr. Robert N. Davies, works director at Cowley and chairman of the motor-car-body divisional board has been appointed a local director of the company.

Mr. G. W. Miller, district motive-power superintendent at Bescot in the Birmingham area for the last eight years, has been appointed district motive-power superintendent, Derby, British Railways (London Midland Region).

Lord Mills, the new Paymaster-General who was Minister of Power in the last government, will be the principal speaker at the annual dinner of the Sheffield Chamber of Commerce at the Cutlers' Hall on November 10.

Guest Keen & Nettlefolds (South Wales), Limited, announces that Mr. A. A. Miller, who was recently appointed London sales manager, will take up his duties at 66, Cannon Street, E.C.4 (telephone: CITy 5070), on November 2.

Mr. W. S. Richards, director and general manager of Brightside Heating and Engineering Company, Limited, Ecclesfield, has been elected president of the Association of Heating, Ventilating and Domestic Engineering Employers.

Sheepbridge Equipment, Limited, of Chesterfield, *Derbyshire*, announce the appointment of Mr. J. G. Francis as their technical representative for
shire and Lincolnshire areas. His address is
Close, Kiveton Park, Sheffield.

Lord Riverdale, chairman and managin
of Arthur Balfour and Company, Limited,
and Lady Riverdale, re-opened the premis
firm's sports and social club at Whirlow,
after alterations, on October 15.

Mr. H. K. Smith, chief metallurgist of
Ward, Limited, and president of the Laborator
has been elected chairman of the executive
of the Sheffield section of the National Trades
Societies, in succession to Mr. A. Bradley.

The Council of the Institution of Naval
has awarded the Aluminium Development As
research scholarship in the application of lig
to ship construction (£600 per annum for two
Mr. C. S. Smith, of the University of Glasgow

Mr. L. B. Devins has been appointed
manager of the Sheffield Wire Rope Company,
of Darnall, Sheffield. The company, which is
ing its golden jubilee this year, was recently
by the Firth Cleveland group of companies

Mr. M. J. S. Clapham, joint managing direct
metals division of Imperial Chemical In
Limited, has been appointed chairman of that
from January 1, 1960. He will succeed Dr.
who retires from the company's service at
of the year.

Mr. Allan F. Campbell has been appoint
tary of Ernest Scragg and Sons, Limited,
machinery manufacturers, Macclesfield, and al
companies forming the Scragg group.
Walker, the former secretary, remains a di
both the company and the group.

Mr. John Bernard Sandham, a former
manager of the construction department of
Armstrong, Limited, Barrow-in-Furness, celeb
golden wedding this month. Mr. Sandhar
work at Vickers when he was 14. He was
assistant manager in 1945, and retired in 1952

Mr. Harry Taylor, chief engineering insp
J. Blakeborough and Sons, Limited, Blak
retired on October 16. He joined the fir
apprentice fitter in 1909, later becoming a fit
erection shop. He was promoted to inspecto
and became chief inspector two years later.

Mr. John McIvor has been appointed Sc
sales manager, and Mr. G. K. Frame, Sc
sales engineer of the British Materials Hand
sion of the Yale & Towne Manufacturing
Limited, Wolverhampton. Both will operate
new sales and service depot at East Kilbri

Dr. O. P. Hansom has been appointed
director of Carter Thermal Industries, Lim
will be responsible for all research and de
within the group companies including Midl
ing & Ventilation Company, Limited. Dr.
was formerly engineering manager of Flexibox
of Manchester.

Mr. John M. Maslin, personnel director
& Pollock, Limited, Oldbury, was elected
of the Institute of Personnel Management at t
general meeting of the Institute at Harr
October 10. He will hold the office for t
Mr. Maslin is president of the Wolverham
Black Country branch of the Institute.

Mr. S. H. **Skirrow** has been appointed service manager of the Ford Motor Company, Limited. He succeeds Mr. A. F. **Harper** who becomes technical assistant to the general sales manager. Mr. E. P. **Tench** has been appointed fleet sales manager in succession to Mr. F. T. **Phipps**, who has retired from that position but remains in an advisory capacity to the general sales manager.

Mr. J. H. **Peck**, for many years manager of the Manchester branch of the foundry supplies section of Thos. W. Ward, Limited, has been appointed manager of the department at its head office, Albion Works, Sheffield. Mr. W. J. **Smith** formerly personal assistant to Mr. Arnold Carr, the deputy chairman of the company, has been appointed assistant manager to Mr. Peck.

Mr. **David Brown**, aged 32, managing director of the tractor division of David Brown & Sons (Huddersfield), Limited, and his wife, were taken to Leeds Infirmary for treatment following a road accident in Geldard Road, Leeds, on October 24. Mr. Brown was allowed to go home after treatment for a head injury, but Mrs. Brown was detained and later was stated to be "fairly comfortable."

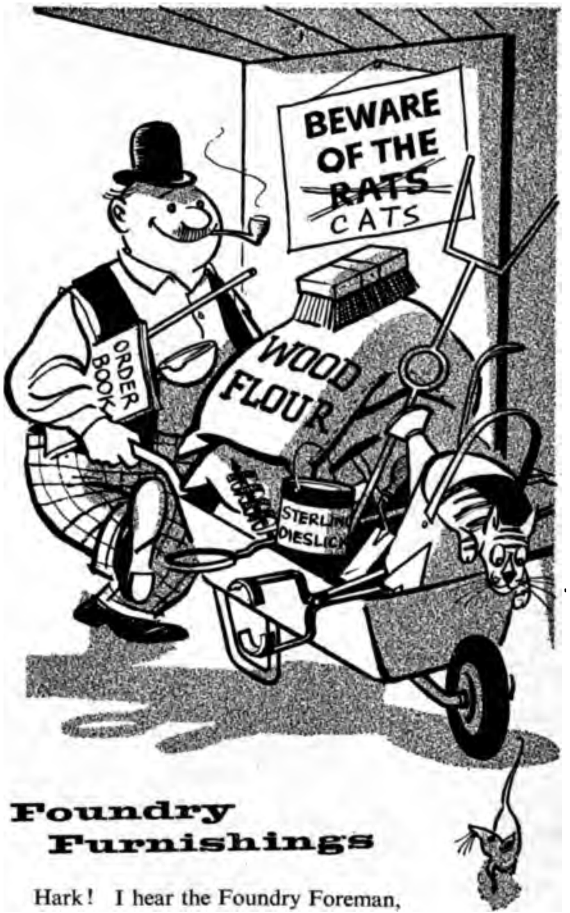
Colonel T. **Eustace Smith**, chairman and managing director of Smith's Dock Company, Limited, South Bank on Tees, and South Shields, has been elected president of the Shipbuilding Conference, in succession to Sir **James Milne**, chairman and managing director of J. Samuel White and Company, Limited, Cowes, Isle of Wight. Mr. **Alexander H. White**, deputy chairman of Lithgows, Limited, Port Glasgow, has been elected vice-president.

Mr. J. E. **Smith** has been appointed managing director of the National Gas and Oil Engine Company, Limited, from January 1. He will also become a member of the Board of Hawker Siddeley Industries. Mr. Smith who is 45 years of age, is at present a director of Richardsons Westgarth & Company, Limited, and managing director of its subsidiary, the North East Marine Engineering Company, Limited. He will resign from these appointments at that date.

Mr. C. S. **Dingley** has resigned from the board of British Industrial Plastics, Limited, after 53 years' continuous service. Mr. **Harold W. Fender**, managing director of Prodorite, Limited and chairman of the British Chemical Plant Manufacturers Association, has been appointed a non-executive director of the company, and Mr. P. **Russell**, director of research and development of the company's subsidiary, B.I.P. Chemicals, Limited, has been appointed an executive director.

Mr. **Michael C. Potts** and Mr. **Peter Sharp** have been appointed directors of Dowty Mining (Canada), Limited. Mr. Sharp has also been appointed general manager. Colonel C. W. **King** has resigned as works director of Rotol, Limited, and of British Messier, Limited. Mr. A. E. **Atkins**, production controller of Dowty Equipment, Limited, has been appointed general works manager of Rotol and British Messier. The companies are all members of the Dowty group.

Mr. R. **Middleton**, engineering division sales manager, of Newton Chambers and Company, Limited, Chapeltown, and Mr. D. **Bradley**, chemical engineer in the engineering division development department of the firm, have been awarded the medal of the Coke Oven Managers' Association for the best paper presented in the past year. Another member of the company, Mr. **Rennie Smith**, received a wrist watch to mark his retirement from the post of timekeeper in the excavator factory machine-shop.



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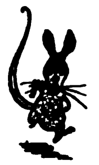

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We have HOOKER'S goods galore man,
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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

October 28, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron). Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent, C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C.* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.: nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £265 0s. 0d. to £265 10s. 0d.; three months, £247 10s. 0d. to £248 0s. 0d.; settlement, £265 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 5d. per lb.: rods, 266s. 0d. per cwt. basis; 20 s.w.g., 301s. 0d. per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £795 0s. 0d. to £795 10s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—Second half October, £70 15s. 0d. to £71 0s. 0d.; second half January, £71 12s. 6d. to £71 17s. 6d.

Zinc.—Second half October, £97 0s. 0d. to £97 10s. 0d.; second half January, £92 0s. 0d. to £92 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 0s. 0d.; rolled zinc (boiler plates), all English destinations, £127 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £102 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0¼d. per lb.: sheets to 10 w.g., 216s. 9d. per cwt.; wire, 2s. 9¾d.; rolled metal, 216s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £171; B6, £220.

Brass (High Tensile).—BS1400, HTB1, £204; HTB2 £220; HTB3, £234.

Gunmetal.—BS1400, LG2, £214; LG3, £224; G1, ½% £277; G1, 1%, £263.

Phosphor Bronze.—BS1400, PB1 (AID released), £313; BS1400, 90/10/1, £292.

Leaded Phosphor Bronze.—BS1400, LPB1, £232.

Phosphor Bronze Strip, etc.—Strip, 305s. 0d. per cwt.: wire, 4s. 2⅝d. per lb.; rods, 3s. 5¾d.; tubes, 3s. 5¾d.; chill cast bars; solids 3s. 5¼d.; cored 3s. 6¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide 0.056, 4s. 0¼d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 5¼d.: special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 4¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 Cs. 0d. Quicksilver, ex-warehouse, £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £258; AB2, £269.

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93, Hope Street,
Central 9969

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

806,576. Hunter Engineering Company, 1495 Columbia Avenue, Riverside, Calif., USA.

Means and apparatus whereby a sheet, strip or bar or rod of metal may be continuously cast, with, according to the invention, such uniformity in quality and freedom from inclusions that the resulting casting may be treated to form a final product exhibiting the maximum properties of the metal.

806,803. British Iron and Steel Research Association, 11, Park Lane, London, W.1.

The casting of metal, in particular continuous casting, in which the liquid metal is poured into an open mould and is withdrawn from the mould as a partly-solidified billet. An objective of this invention is to enable the billet to be released from the mould with the minimum of difficulty, while reducing the chances of rupturing of the billet skin.

806,942. Sunbeam Corporation, 5600 Roosevelt Road, Chicago, 50, Ill., USA.

Sole-plates for electric irons, cast as a composite metal, *i.e.*, aluminium for lightness, with an ironing surface of stainless steel for resistance to scratching.

806,991. Phœnix-Rheinrohr, A.G., Vereingte Hutten- und-Rohrenwerke, Ronsdorferstrasse 130/180, Düsseldorf, Germany.

Apparatus for casting under reduced pressure. This method, which is claimed to be simpler and quicker and less expensive than previous methods, does not require either a vacuum chamber or an intermediate vessel. Also the joints which need to be sealed are considerably fewer in number.

807,038. R. W. Taccone, 28 Chautauqua Boulevard, Erie, Penns., USA.

An improvement on the "jolt" method for compacting granular material to provide a solid lining when casting articles in deep cavities in moulding sand.

807,044. Corn Products Refining Company, 17, Battery Place, New York, N.Y., USA.

New core-binders, and a process for making cores suitable for use in the production of metal castings. To 100 parts of sand, there is mixed 0.25 to 2 parts of a cereal binder, 0.5 to 5 parts of a sugar, such as dextrose, sucrose or fructose, and 0.002 to 1.05 parts of an inorganic adjunct selected from the group consisting of: hydrochloric acid, sodium chloride, a mixture of paraformaldehyde and ammonium chloride, a mixture of paraformaldehyde and hydrochloric acid, and boric acid—but excluding vegetable gum. Sufficient water is added to mill the mix, which is subsequently baked at a temperature of at least 350 deg. F.

807,319. Griffin Wheel Company, 445 North Sacramento Boulevard, Chicago, Cook, Ill., USA.

Foundry moulds, in particular those adapted for use with pressure casting apparatus. (See also B.P. 721,065.) The molten metal is forced upward under pressure through a gate, and thence into the bottom of the mould cavity. A stopper moves down to close the gate, after the cavity has been filled with molten metal.

807,363. Eisenwerke Gelsenkirchen, A.G., Hohenzollerrnstrasse 2-4, Gelsenkirchen, Germany.

An improved method for the casting of hollow metallic bodies having a closed end.

807,531. Patentverwertungsgesellschaft für Eisen und Metalle, m.B.H., Salzkotten, Westphalia, Germany.

Process for the production of castings, particularly from melts of iron and its alloys including steels, but applicable also to non-ferrous metals such as aluminium containing impurities, in the form of oxide-slag inclusions, capable of being reduced by hydrogen. This is effected by a gas treatment of the melts. Hydrogen is introduced either as a hydride, such as calcium hydride or magnesium hydride. Claims are also made in this invention for the hydride pastilles to be coated with paraffin, plastics, or encased in sheet-iron capsules.

807,633. W. C. Cheney, 404 South Oak Street, Lake City, Minnesota, USA.

Cast light-metal pistons for internal-combustion engines of the fuel-injection type. This type of piston has a ferrous-metal insert in the head portion to receive the high-velocity jet of fuel injected.

807,673. George Blair & Company, Limited, Armond Carr Works, Tow Law, Durham.

In the casting of articles in iron and steel it is proposed to have one or more holes in each mould perpendicular to the moulding surface normal to the direction in which the moulded article is to be ejected. Push rods are employed, adapted to enter and partially occupy these holes so that when the molten metal is poured it flows into these holes until it comes up against the ends of the push rods. On cooling, pips are formed on the surface of the moulded article, the casting being forcibly ejected from the mould on cooling by pressure exerted by the push rods on the pips. These pips can be easily removed from the castings, after the latter have cooled, by machining.

New Catalogues

Machining Facilities. No better service can be given by a steelfounder than to accord to his customers machining facilities. F. H. Lloyd & Company, Limited, James Bridge Steel Works, Wednesbury, South Staffordshire, have issued a magnificent brochure detailing the plant the company has available for machining large-size steel castings. Seldom has the reviewer seen a more impressive picture than the central double-page spread showing an excellent colour printing of a 22-ft. Froriep vertical borer. The brochure is beyond doubt one of the finest ever issued by the foundry industry, the photography and printing being of a particularly high standard.

Sawdust Extraction Plant. Folder No. 65 issued by Dallow Lambert & Company, Limited, Thurmaston, Leicester, is of interest to master patternmakers and founders who operate patternshops. It describes and illustrates a number of plants the firm has installed for the purpose indicated by the title, and terminates with a series of excellent maintenance hints.

The death has occurred of Mr. John Carson, a former manager of Harland & Wolff, Limited, shiprepairers, of Bootle, Liverpool. He joined the Liverpool staff of Harland & Wolff in 1913 as chief draughtsman, after serving an engineering apprenticeship with Barclay, Curle & Company, Limited, Glasgow, and later with William Denny & Bros., Limited, Dumbarton. He held the position of manager of the Bootle works from 1917 until he retired in 1955. Mr. Carson was a past-president of the Liverpool Marine Engineers and Naval Architects' Guild and also served as chairman of the Liverpool Dry Dock Owners' and Repairers' Council.

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EST. 1902

TRADE JOU

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NOVEMBER 5, 1959
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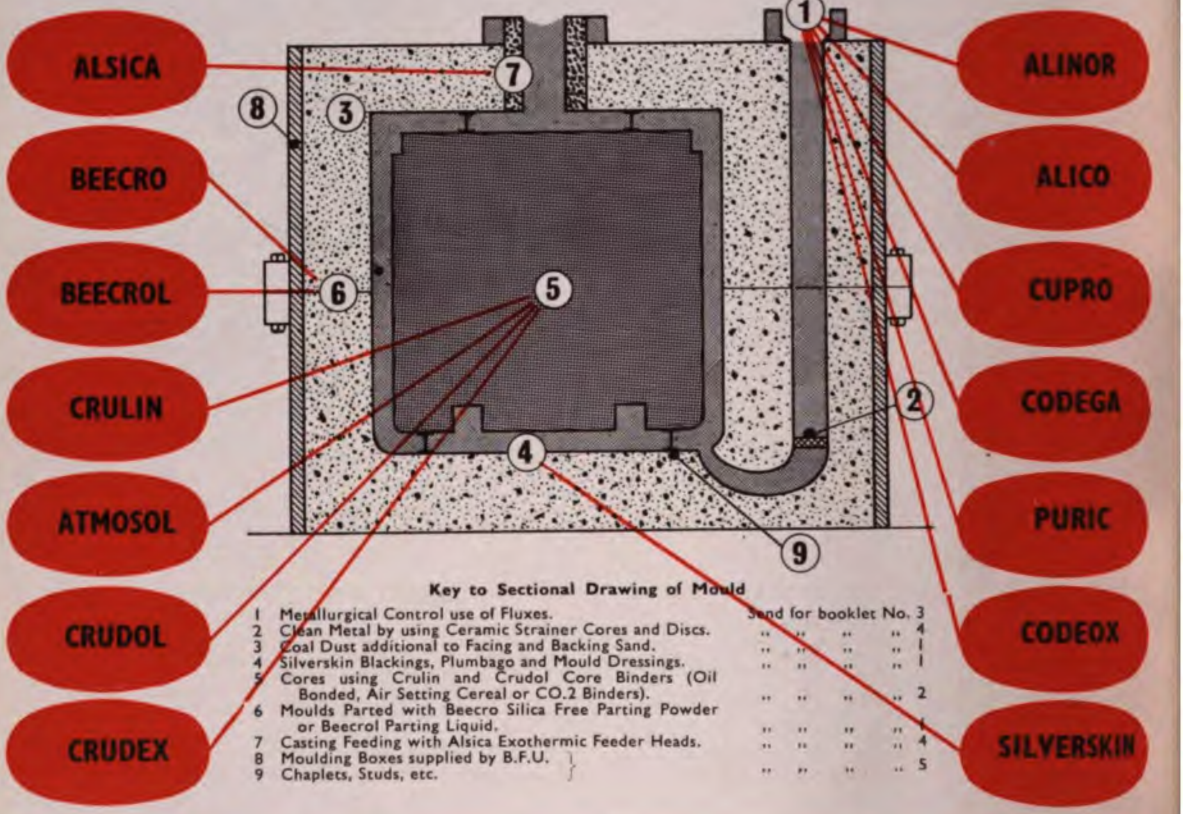

Key to Sectional Drawing of Mould

		Send for booklet No.
1	Metallurgical Control use of Fluxes.	3
2	Clean Metal by using Ceramic Strainer Cores and Discs.	4
3	Coal Dust additional to Facing and Backing Sand.	1
4	Silverskin Blackings, Plumbago and Mould Dressings.	1
5	Cores using Crulin and Crudol Core Binders (Oil Bonded, Air Setting Cereal or CO.2 Binders).	2
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FOUNDRY TRADE JOURNAL

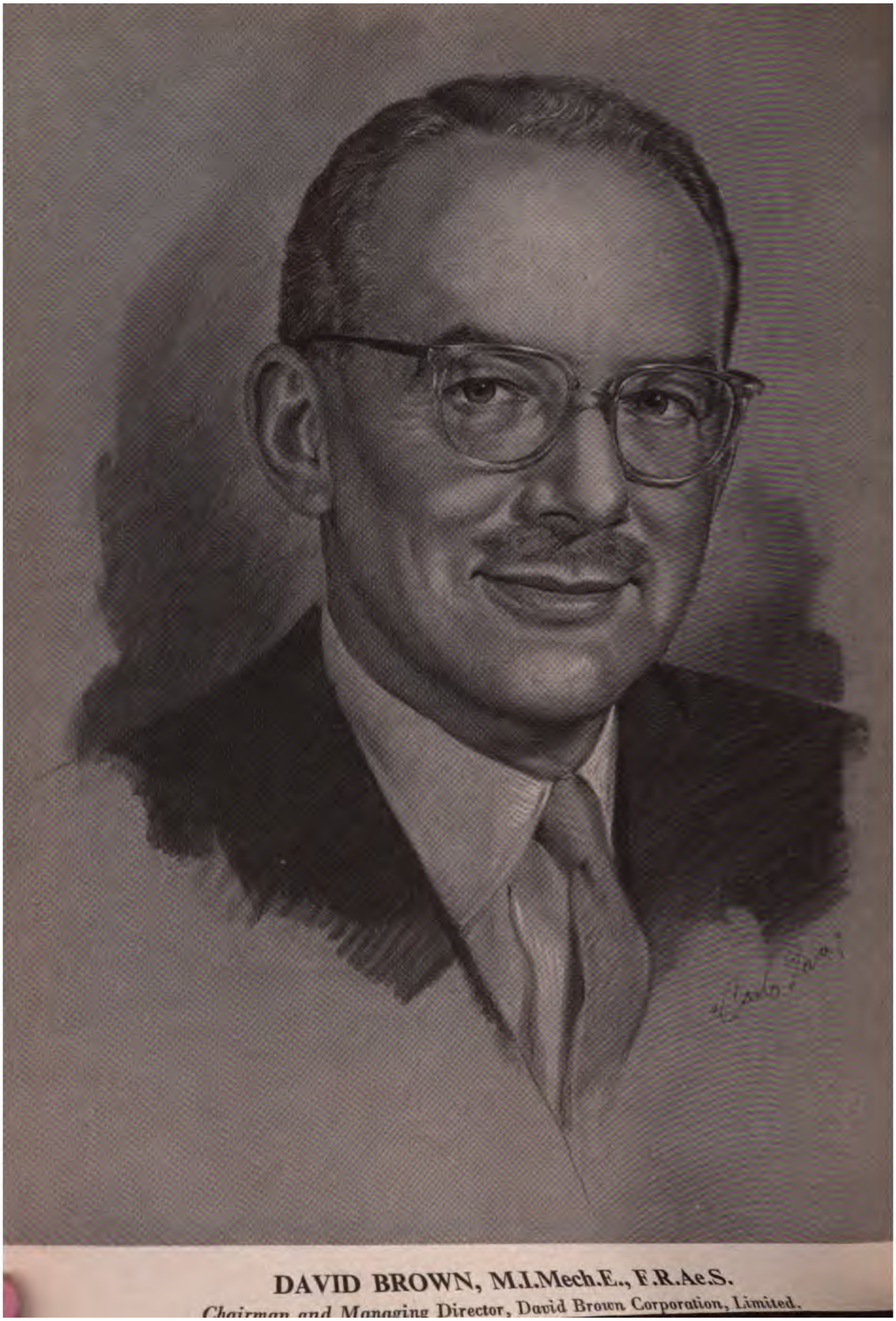
Vol. 107 NOVEMBER 5, 1959 No. 2239

Ministry for Science

Lord Hailsham at a Press conference, called to introduce himself as head of the new Ministry of Science, devoted the major part of his speech to telling his audience of the many aspects of scientific activities which he as the Minister would leave severely alone for the good work that was being done to continue. Many of the Ministries, such as Education, Power, Transport, Agriculture and Health, were concerned with scientific developments and their activities in this direction would still be under their own control. However, he intended, he said, to utilize to the full the Government's Advisory Council on Scientific Policy—a body composed of Government and other scientists—and by so doing, he would strive to make " the voice of science coherent and articulate under Government encouragement, and in a real sense to make science self-governing under Government inspiration."

Perhaps in this context, the most significant statement made was that he looked forward to receiving at an early date a report from the committee set up under the chairmanship of the late Sir Claude Gibb (now chaired by Sir Solly Zuckerman) on techniques of management and control of Government-financed research and development. He also proposed, he said, to show a personal interest in applied research carried out by private industry and in industrial research associations under the general authority of the Department of Scientific and Industrial Research. The underlying principle of the new Ministry was to be one of long-term policy—that of enhancing British prestige in the world, and with it, prosperity and culture, he concluded.

From the industrial point of view, the general census of opinion is that more and better research is a necessity, but many people feel there is a certain amount of overlapping, possibly involving a waste of time and money. This aspect is more apparent than real, as those in charge of research stations do in fact co-operate to avoid repetition. So far as those covering the metallurgical industries are concerned, the co-operation is close and no specific research is duplicated. Moreover, when matters of joint interest are undertaken, such as in determining factors which affect the " life " of ingot moulds, then a common attack is made on the problem by the research associations concerned. We are convinced that for the three research associations which cater for the foundry industry, their streamlining into one huge concern, would be a retrograde step and one much deplored by those utilizing their services.



DAVID BROWN, M.I.Mech.E., F.R.Ae.S.

Chairman and Managing Director, David Brown Corporation, Limited.

atuxing . . . .

DAVID BROWN, M.I.Mech.E., F.R.Ae.S.

MR. DAVID BROWN, chairman and managing director of the David Brown Corporation, Limited—a concern employing over 10,000 people—was born in Huddersfield in 1904. The David Brown business was started by his grandfather, a patternmaker by trade, who specialized in the making of wood patterns for gear work, and to-day, gearmaking forms a major activity in his firm's operations. In addition to catering for the requirements of the group's engineering divisions, the Corporation's foundry at Penistone, near Sheffield, services British industry as a whole with steel and bronze castings. Here, the Randupson cement/sand method was pioneered and to this day, the Penistone foundry is the only one in the country operating this system for the production of steel castings, though it has been successfully exploited by the makers of non-ferrous propellers.

Mr. Brown was educated privately and at Rossall School. He joined the family gearmaking business at the age of 17 as an apprentice, and by the time he was 25, was appointed a director, and four years later was made managing director. From then onwards, the firm expanded to include the manufacture of tractors and motor cars. This latter activity had its origin in Mr. Brown's youthful participation in motor racing, a sport in which he won a number of trophies. Since (during 1947/48) he acquired the Aston Martin and Lagonda companies, he has so revitalized their activities that this year his team won the Sports Car World Championship. All his hobbies centre around racing and speed. Mr. Brown holds a pilot's certificate and makes extensive use of his organization's private aircraft—a de Havilland Dove, based on an airstrip near Huddersfield. His stables breed hunters and steeplechasers, whilst a further hobby is that of yachting—Mr. Brown is a member of the Royal Thames Yacht Club. A unique honour was bestowed on Mr. Brown in January of this year when he was inaugurated Chief Flying Sun of the Iroquois Tribe of the Mohawk Nation in Toronto. He is a member of the Institution of Mechanical Engineers, an Associated Fellow of the Royal Aeronautical Society, an Underwriting member of Lloyd's, and a Freeman of the City of London.

National Works Visits Day

Record Attendance in London on October 30

The tenth National Works Visits Day function, organized this year in London by the Institute of British Foundrymen, brought a record attendance of members to the Metropolis. This is the one day in the year when members of the Institute from all over the country make up parties for visits to foundries in a particular area, thus supplementing works visits arranged at the time of the Institute's annual conference. This year, about 230 foregathered for the visits to the eight works[*] which had issued invitations —Ford Motor Company, Limited (Thames and Dagenham foundries); K. & L. Steelfounders and Engineers, Limited (Letchworth); Langley Alloys, Limited and G. D. Peters & Company, Limited (grouped visit in the Slough area); British Bath Company, Limited, and Le Grand Western Foundries, Limited (grouped visit in the Greenford/Southall area); Broom & Wade, Limited (High Wycombe) and R. & A. Main, Limited (Edmonton). All the parties left central London by coach in the early morning, returning there in the evening, luncheon and tea being taken with one or other of the host companies according to the party arrangements. In the evening, as is the custom, the parties of members reassembled for dinner at which representatives from the firms visited were honoured guests.

Dinner

The dinner in the evening was held in Lyons Corner House, Tottenham Court Road, London, and about 160 attended. The chair was taken by Mr. John Bain, A.M.I.MECH.E., president of the London branch, supported by the national president, Mr. C. H. Wilson, and a number of past-presidents and senior officials of the Institute. After the "Loyal Toast," the chairman proposed the health of the guests, mentioning them all and their firms by name and saying how much the Institute was indebted to them for giving such a grand welcome to the parties and dispensing such lavish hospitality. He referred jocularly to the original circular about the programme which had described the function as the tenth "experiment" in the series. In foundry parlance, he said, if it needed ten trials to decide how to make a casting, he wondered when a "Good 'un" would be made! It seemed quite clear from the success that attended these functions that they were already incorporated as a very worthwhile event in the Institute's annual calendar. Mr. G. R. Webster (director, British Bath Company, Limited) replied for the guests, stressing how much these visits were always a matter of reciprocity, the hosts learning much from their visitors.

Mr. C. H. Wilson then voiced members' thanks to the London branch for organizing the function this year and went on to propound a new conception of the status of the occasion. He put forward the idea that because of the difficulty of organizing large national conferences always in an area where there were also adequate opportunities for works visits, it might be better to replace the works visits part of a national conference by attaching much greater importance to the National Works Visits Day functions. In response to several requests, Mr. R. B. Templeton then addressed the gathering. (It was when Mr. Templeton was president of the Institute that the first of these annual series of visits was organized.) He denied the suggestion that the original conception of the visits was his and graciously mentioned other officers of the Institute in this connection. He had only acted as a sponsor to put into concrete form the feelings of many at the time, he said.

The proceedings concluded with light entertainment, the whole evening's programme being excellently compèred by Mr. L. A. S. Harbourne. Thanks were expressed during the evening also to the secretariat of the London branch for the excellent general arrangements and to the stewards who had assisted in the detail working out of the day's events.

(Concluded at foot of column 2)

Forthcoming Events

NOVEMBER 9

Institute of British Foundrymen

Lancashire branch:—"Light-alloy Castings," by T. Williams, 7 p.m., at the Midland Hotel, Manchester.

NOVEMBER 10

Institution of Production Engineers

Birmingham graduate section:—"Industrial Law," by E. A. Pratt, 7 p.m., at the James Watt Institute.

Institute of British Foundrymen

Coventry section:—"Services of the British Cast Iron Research Association to the Ironfounding Industry," by H. Morrogh, 7.30 p.m., Coventry Technical College, Room A5.

NOVEMBER 11

Combustion Engineering Association

Northern region:—Discussion of "Factors Affecting the Choice of a New Boiler Plant," 2.30 p.m., at the Royal Station Hotel, Newcastle-upon-Tyne.

Institute of British Foundrymen

West Riding of Yorkshire branch:—"Some Casting Defects—their Cause and Cure," by J. L. Francis, 7.30 p.m., at the Bradford Institute of Technology.

Institute of Welding

South London branch:—"Welding and Lloyd's," by G. M. Boyd, 7 for 7.30 p.m., at 54, Princes Gate, London, S.W.7.

Institution of Production Engineers

Wolverhampton branch:—Film evening: "Britain's Heaviest Steel Casting"; "Structural Steel at our Fingertips"; "Chips" and "Finding the Time," 7.15 p.m., at the Dudley & Staffs Technical College.

Institution of Plant Engineers

Western section:—"Developments in the Gas Industry," by W. A. Simmonds, 7.30 p.m., at the Grand Hotel, Broad Street, Bristol.

NOVEMBER 12

Institute of Fuel

Merseyside sub-section:—"Smoke Density and Various Aspects of Grit and Dust Emission," by P. G. W. Hawksley, 7 p.m., at the Liverpool Engineering Society's Rooms, 9, The Temple, Dale Street, Liverpool.

Midland section:—"Flue-gas Additives," by E. Brett Davies, 6.30 p.m., at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham, 2.

Institute of British Foundrymen

Beds. & Herts section:—Evening visit to the Norton Grinding Wheel Company, Limited, Welwyn Garden City, Herts, 7 to 8 p.m.

NOVEMBER 13

F Scientific Societies in South Wales and Monmouthshire

"Research and Development in the DSIR Stations," by Sir Harry Melville, 6.45 p.m., in the Reardon-Smith Lecture Theatre, National Museum of Wales, Cardiff.

Institute of British Foundrymen

East Anglian section:—Dinner and social evening, 7 p.m., at the Oriental Cafe, Westgate Street, Ipswich.

NOVEMBER 14

Institute of British Foundrymen

Scottish branch:—"Production of Heavy General Engineering and Jobbing Castings using Air-set Cores," by A. Shirley, 3 p.m., at the Royal College of Science and Technology, George Street, Glasgow.

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[*] All these establishments were described briefly in the JOURNALS of October 22 and 29.

: Control
he Foundry

*By D.A. Crooks**

The application of a work study system to a foundry is considered in detail in this article, both theory and practice being dealt with. Useful hints are given on how to introduce controls into a works without causing friction with established departments. Specimen time-and-motion study sheets and graphs are set out, and two different systems of cost control are explained.

.in objects of installing and operating a
cost control are: (*a*) to reveal quickly
(*b*) to eliminate all sources of waste, and
ɔse unnecessary losses of time, effort and
in the manufacture of individual or
castings. Other objects are:

levelop a practical and accurate approach
ing, relative to actual conditions in the

stablish accurate information on what is
, why it is being done, how, where, when
ɪom it is being done.

obtain harmonious working conditions,
sent, both to management and workers,
h will be mutually beneficial.

ors Influencing Foundry Operation

ed with these objects are the three prin-
ɔrs governing profitable operations in a
vhich are:

ect estimation of the cost of manufacture
dividual casting.

lity to manufacture at this cost, and to
he necessary data and information to
hat this has been done.

very of a sound dependable casting—in
ds, tight control of defective castings.

Estimating

ng is the initial stage of operations, and
the complete cycle of events which is
or each job. Firstly, it is the primary
gaining or losing work. Secondly, it is
ick to be used by managers and foremen
uties, and also in their attitude towards
Finally, estimating determines whether a
oss will result.

Two Controls are Necessary

.pproach to control of cost, procedures in
the technique of manufacturing a casting
l technology, metallurgy, and casting
basic to successful and profitable opera-
ɪy foundry. Hence, it is recommended
ɪistration be divided into two controls:—

ɪtrol of manufacturing and operational procedures—termed "Quality Control Department."

(*b*) Control of costs and economies involved in the manufacture of castings—termed "Standards Department," or "Work Study Department." This paper considers (*b*) in detail.

WORK STUDY

"Standards" and "Work Study" must inevitably go together, because factual data must be available before any standard can be set. The standard in this instance is associated primarily with time, and therefore the function of the work study department is to study and record the "motions" of all elements of production, and elapsed "time" over any period. It is, of course, a fact that conditions vary between foundries, but whatever the peculiarities may be the basic principles associated with methods and personnel are fundamentally the same. These features of the foundry industry provide a foundation for the creation and successful operation of a standards or work study department.

Cost Department Personnel

"Control of costs" demands control within the department responsible for its effective execution, therefore the department's personnel must be of the balanced type possessing a sound knowledge of foundry practices, and must have a strong character and pleasing personality. These qualities are essential for those who, in the course of their duty, must inevitably make changes in old-established methods, both at shop-floor level and in office routine. Such changes naturally unsettle the producer—the supervisory staff, also, must develop a new outlook on their responsibilities. The latter point requires special stress if the anticipated snags are to be smoothed out, for supervisors who are not receptive to progressive changes are continually retarding progress.

MOTION STUDY

The first objective of any new cost control department is to establish a complete knowledge and written report on conditions in the foundry relative to: plant layout; mechanical aids; methods of production; personnel engaged; location of buildings, and material storage and administrative organization. This information can only be gathered by devoting long periods of time to continuous motion and observation studies in all sections of the

---

hor is foundry manager at Ashmore, Benson,
npany, Limited.

foundry. In the course of this initial overall survey it is most probable that specific areas or operations may demand a more detailed study than normal, particularly where repetition work is involved. No less than six continuous cycles on work of this nature should be studied in order to ensure that almost every possible deviation is witnessed and accounted for.

Sketches and Questions

At the same time as any study is being taken, it is a distinct advantage to make freehand sketches showing plan views of: building design; fixed plant location; works stations, and storage or placing of equipment. This build-up of general information can be further extended by questioning the men on the job about their conditions of work, for such voluntary statements sometimes reveal advantages.

TABLE 1.—*Time Study Sheet.*

Study No 26A	*Operation* Coremaking	*Date* 27.1.53	*Dept.* Mech. Fdry.	
Patt. No. L-OHH	*Client* Detrick	*Dwg.*	*No. in Box*	*Cores* 1
Size: *Wheel* *Corebox* 16 by 4 by 3 in. deep Wood in halves		*Volume* 40 cub. in. *Area* 16 sq. in.	*Effort* Good *Class* Average	
Size: *Pattern* *Core* *Plate*		*Loose Pieces* *Chaplets*	*Gaggers* 1 *Type*	
Operator Hunter	*Helper*—	*Start* 10.34	*Stop* 10.44	*Elapse* 10 min.

No.	*Elements*	Cycles. 1	2	3	4	5	6	7	8		*Average*
1	Set box	—	4	4	4	4	4	5	11		4
2	Place 2 clamps	10	6	10	6	10	6	6	6		7
3	Place sand. Hand and tuck	15	15	16	M	14	11	10	14		14
4	Ram (pin)	12	14	14	(25)	15	17	16	16		16
5	Place iron	5	5	8	6	7	8	7	5		6
6	Place sand	3	4	4	7	9	4	4	5		5
7	Ram M. Sh.	6	6	7	—	5	5	6	—		6
8	Place sand	4	4	5	—	—	—	—	—		4
9	Flat ram	5	5	5	M	4	4	6	8		5
10	Strike off	9	7	8	(12)	6	6	6	9		7
11	Clean bench	4	4	4	—	4	4	4	4		4
12	Remove clamps	7	5	8	8	6	8	7	7		7
13	Move to plate and oven		7	M	7	5	5	5	5		6
14	Draw half box	7	6	M	5	5	5	5	8		6
15	Draw half box	8	7	(16)	6	6	5	6	5		6
16		95	99	109	86	100	92	93	96		7.70
17											
18	Move tray conveyor				17						0.17
19	Observe 2.13										2.13
20											
21	8 cores per tray										
22											
23	No delay										
24											
25											
26											
27											
28											
29											
30											

ks, which are not discovered during the ıdy. However, whether this diplomatic ıken or not, it is essential that each ıe organization should be studied under 'ariable conditions.

ANALYSIS OF DATA

ral that a point will be reached when udy team declare themselves satisfied ɔllection of data, which should provide picture of the foundry organization. preliminary stage a wealth of material been logged, and from an analysis of a measure of efficiency may be estab- will provide the foundation for formu- ɔrocedures in the process of cost con-

n of Appropriate Improvements

ıf the available data is likely to produce schemes which, in the opinion of the lepartment, are necessary to achieve 'orking conditions and increased pro-
h less fatigue and controlled costs, but nization programmes normally call for :nditure. Furthermore, the movement ɔn of plant may call for alterations to r a proposed change to benefit one completely disorganize another. There- to any recommendation being made to nent, all aspects must be considered in letail. It is, of course, reasonable to a company which is prepared to invest :ation of work study must also be ready roposals put forward as the result of However, it is important that practical substantiated with relative degrees of nd also comparative costs of produc- 'mation should be available from the partment regarding actual costs of pro- ler existing methods and conditions of d from the new standards department ı accurate estimate of cost for either a ɛctional, reorganization.

ɪence of Annual Budgets, etc.

'e of the recommendation submitted for ⁄ the management will naturally vary ry to foundry, but it is indeed rare if the best results can be achieved without immediate capital expenditure in some form or another, and this critical milestone in the progress of the new department requires a wise and sympathetic consideration by both parties. The standards department, in its enthusiasm, may fail to understand why the management is not inclined to embark upon immediate spending in this direction when such positive savings can be envisaged, whilst alternatively the management might expect results from this new approach to cost control without the company having to take calculated risks. There is value in both observations, and the correct conclusion is that the management spend wisely and in accordance with annual budgets, etc., but also give maximum encouragement on all aspects of the proposals, thereby dispelling any sense of frustration in the standards personnel.

A Challenge

If a policy of no immediate capital expenditure has to be accepted, the standards department will in fact be meeting a challenge to prove the real value of work study. In this case, improvements such as: re-siting work stations; establishing flow lines within sections; providing services to encourage unbroken production cycles, and recommending changes in production methods to eliminate waste of time and effort, must be considered. Such changes may be considered bold and spectacular, but, when each in turn is made effective, the stage will be set for a further development in establishing standards of time for all direct operations on production.

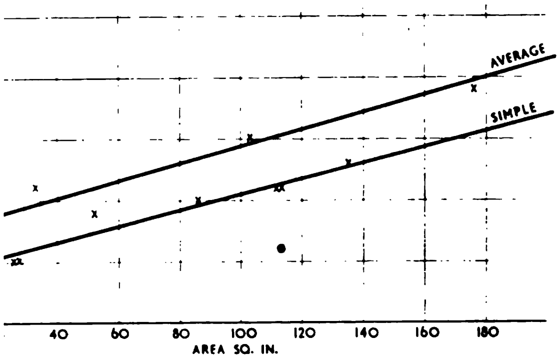

FIG. 1.—*Graph of time-studies regarding variable element " flat ram No. 5." This example is taken from hand core-making in the mechanical foundry, using female labour.*

TIME STUDY

The attainment of this stage of cost control reveals how positive is the relationship between the factors What, Why, Where, When, Who, How, and the greatest factor and yardstick, *Time*. To evaluate any one of these is perhaps a major project in itself, but a constant reference to this combination of questions makes plain the full value of each. This combination forms the nucleus for every time study, and can be readily applied to the elements of moulding, coremaking and dressing, which are the three main phases of casting production.

Cost Control in the Foundry

Preliminary Discussion

Making a time study in a foundry requires a technique embodying the following factors: (1) A practical knowledge of foundry work and terminology; (2) an appreciation of the degree of effort being imparted to the procedure; (3) the ability to take accurate time recordings of element breakdown at consistent breaking points, and (4) an intelligent application of notes on common or uncommon procedures. The personal approach to this work is of major importance, and often calls for tactful handling of delicate situations. Time study has never been acclaimed as a popular exercise, particularly by craftsmen. It is therefore vital that a co-operative attitude be established between the producer and the time study engineer. This condition is perhaps achieved most simply by having a brief preliminary discussion on the ultimate advantages of this fact-finding operation, provided that the producer performs in a way which contributes to a high standard of workmanship at the same time as displaying an appreciation of the need to save time.

Time Study in a Jobbing Foundry

From this stage onwards the work study engineer will become a familiar figure on the shop floor, for the duration of this most important aspect of his work is never short. The number of individual job studies necessary will be controlled primarily

TABLE 2.—*Summary of Coremaking Time Studies, with Female Labour (continued on facing page).*

No.	*Element.*	*Type, constant or variable)*	*Study Area Vol.*	1A 176 380	2A 143 52	3A — —	4A 9 5	5A 26 34	8A 135 139	9A 24 46	12A 16 33	13A 26 34	14A 113 120	15A — —	16A 21 33
1	Set box	C		14	5				5		$\frac{6}{0\cdot5}$	2	5		
2	Place clamps ..	V					$\frac{5}{2}$				$\frac{10}{2}$				[illegible]
3	Place sand ..	C		16	5			4	6	4	4		11		[illegible]
4	Ram w. rammer pin	C		26					12	5	13		16		[illegible]
5	Flat ram ..	V		19				5	13			5	11		[illegible]
6	Strike off ..	C		30	20	6	4	4	12	5	31	6	35		[illegible]
7	Remove clamps..	V					$\frac{4}{2}$			5	$\frac{4}{2}$				
8	Part box ..	V					5								[illegible]
9	Set core on plate	V				$\frac{10}{1}$	$\frac{10}{3}$				$\frac{6}{1}$				[illegible]
10	Place irons ..	V			$\frac{5}{1}$			4	4		$\frac{11}{1}$		$\frac{11}{2}$		[illegible]
11	Place sand and tuck	V		65		33			15			6			
12	Place irons ..	V		$\frac{94}{9}$	$\frac{5}{1}$							$\frac{4}{1}$	26		
13	Ram w. rammer pin	C		16	8					4	30		31		
14	Place sand ..	C		6	4				4	5	10	2	36		
15	Place plate ..	C		9	5	8			} 11				6	}	
16	Roll over ..	C		18	4	3		5		4	4		5		
17	Rap and draw ..	C		17	5	10		2	5	5	14	6	14		
18	Trim core ..	V		11	9										
19	Carry to st. and return	V		$\frac{72}{1}$		$\frac{22}{4}$					$\frac{37}{4}$		21		
20	Tuck w.h. ..	V			5	10									
21	Gum iron ..	V			$\frac{6}{1}$										
22	To conveyor ..	V			7				8	18		11			
23	Clean joint (trowel)	V				22									
24	Get block pl. s. pops	V				14									
25	Bed down block	V				11									
26	R. sand and strike	V				36									
27	Pl. sand ram ..	V				8	25	5							
28	Draw loose piece	V				$\frac{6}{1}$					$\frac{9}{1}$				
29	Get and place drier	V													
30	Place sand pack	V				7					10				
31	Roll over to ram	V				11									
32	Clean bench ..	V				5					4				
33	Set ½ box ..	V					4	4			6				
34	Rap box ..	V									7				
35	Form ingates ..	V									5				
36	Pl. baked core ..	V													
37	Pl. lift eye ..	V													
38	Pl. in machine to draw	V													
39	Draw l. ring ..	V													
40	Pl. bl. s. frame ..	V													
41	Pl. black sand ..	V													
42	Tuck black sand	V													
43	Str. off bl. sand ..	V													
44	Remove frame ..	V													

nge of castings being produced. A jobdry, which produces work of all sizes and f complexity, demands a long and patient vertheless, it is this type of foundry which the greatest benefit from work study, contrary to general opinion, predeterne values can be established accurately for ration in casting production.

Two Different Techniques

rhaps fitting at this point to draw attene fact that, although time study is the only base on which to establish predetermined al times, it allows of at least two different s which may be developed and applied ting and/or price fixing. It will be readily d that, for small repetition work associated with either machine-moulding, light coremaking or mechanical dressing, a greater degree of accuracy in assessing allowed time is necessary, in contrast to the longer-cycle work necessary with operational times in excess of 15 min. These two conditions are therefore considered under the respective headings of "Element Standards" and "Classified Standards."

"Element Standards"

"Element Standards" of time are established from a somewhat detailed analysis of the information contained in Time Studies, whereas "Classified Standards" are derived from a more summarized version of total actual job time taken. Typical examples of the "Element Standards" method of tabulating every relevant factor are

TABLE 2.—*Summary of Coremaking Time Studies (using Female Labour).*

Element.	*Type, (constant or variable).*	*Study Area Vol.*	17A 86 105	18A 20 20	19A 52 48	20A 103 112	21A 113 120	22A 113 120	23A 8 15	24A 33 76	25A 16 11	26A 16 40	27A 49 2½
x	C				12	5	4	10	4	11	5	4	11
clamps	V								$\frac{11}{2}$			7	
sand	C		6	4	4	7	6	6	4	4	5		} 21
v. rammer pin	C		11	8		26	10	10	10	6	14	16	
m	V		10	8	9	15	11	6	5	11		5	
off	C		12	11	15	16	26	28	5	29	9	7	
e clamps ..	V								$\frac{7}{2}$			7	
ox	V								9				
re on plate ..	V			$\frac{12}{4}$		$\frac{6}{1}$			$\frac{9}{1}$		$\frac{7}{1}$	$\frac{6}{1}$	
rons	V		$\frac{10}{1}$	6	$\frac{6}{2}$	$\frac{13}{1}$	$\frac{9}{2}$	$\frac{14}{2}$				6	$\frac{13}{1}$
and and tuck ..	V		4		10					26	22	14	
rons	V						15	18					$\frac{16}{3}$
v. rammer pin	C						21	33		15		6	} 28
sand	C			3	4	6	25	28		23	5	9	
plate	C				4	9	6	6		8	4		7
ver	C		10	6	5	4	5	5		5	4		6
ad draw ..	C		6	8	5	9	6	7		8	7	12	20
ore	V			13			11	17					45
to st. and rn	V												11
w.h.	V				12								
ron	V												$\frac{32}{3}$
veyor	V		20	22	9	18	13	26		11	6		
joint (trowel) ..	V												
ock pl. s. pops	V												
wn block ..	V												
d and strike ..	V												
d ram ..	V												
loose piece ..	V				$\frac{5}{1}$						$\frac{7}{1}$		32
d place drier ..	V												
sand pack ..	V												
ver to ram ..	V												
bench	V		6					9				4	
ox	V												11
x	V												
ngates ..	V			10									
aked core ..	V			11									
ift eye	V									14			
achine to draw	V									4 9			
ring	V												
ck sand frame	V												7
lack sand ..	V												14
lack sand ..	V												5
black sand ..	V												8
e frame ..	V												5

TABLE 3.—*Time Values for Coremaking in Mechanical Foundry (Manufacture by hand using Female Labour).*

Number.	*Constant element.*	*Constant time.* D	A	S	*Variable time.* D	A	S	
3, 4, 11. 13, 14, 27	Place sand and ram	0.46	0.14	0.06	0.022	0.020	0.013	
					0.022	0.020	0.013	per 10 cub. in.
1	Set box	0.033	0.03	0.013	0.018	0.006	0.003	
6	Strike off	0.21	0.08	0.03	0.019	0.012	0.01	
15	Place plate	0.035	0.035	0.035	0.003	0.003	0.003	
16	Roll over	0.05	0.05	0.05	—	—	—	
17	Rap and draw	0.10	0.05	0.02	0.010	0.007	0.003	
		0.888	0.385	0.208	0.050	0.028	0.019	per 10 sq. in.
	Variable elements.							
22	Cores to conveyor	0.085	0.085	0.085	—	—	—	per tray.
20	Tuck with hands	—	—	—	0.057	0.025	—	per 10 cub. in.
5	Flat ram	0.075	0.075	0.04	0.007	0.007	0.006	per 10 sq. in.
10-12	Place irons	0.06	0.02	—	0.12	0.10	0.05	per iron.
9	Set cores on plate	0.075	0.05	0.05	0.02	0.015	0.015	per core.
8	Part box	0.045	0.045	0.045	0.012	0.012	0.012	per 10 cub. in.
2-7	Place clamps	0.18	0.14	0.09	—	—	—	per 2 clamps.
28	Draw loose-piece	0.01	0.01	0.01	0.06	0.06	0.06	per piece.
29	Get and place drier		0.08					
30	Place sand packs		0.11^{2}					
31	Rollover to ram		0.05					
32	Clear bench		—					
33	Set ½-box		0.09					
34	Rap box		0.05					
35	Form ingates		0.10^{9}					
36	Place baked core		0.11					
37	Place lift eye		0.14^{1}					
38	Place box in machine to draw		0.04					
39	Draw loose ring		0.09					
40	Place bl. sand frame		0.07					
41	Place black sand		0.14					
42	Tuck bl. sand		0.05					
43	Str. off bl. sand		0.08					
44	Remove Frame		0.05					

TABLE 4.—*Mechanical Foundry Coremaking Standards ("Element Standards" Job card).*

Client: *Weyburn Eng. Co.* Part No. *17431* Enq. No. Date
Box size Area *67 sq. in.* Vol ½ Vol. ½ Total vol. *220 cub. in.*
Details: *Split wood box. 2 clamps. 1 ring iron. 1 rod. 1 vent. Roll over.*

Class: *Average*				Class							
Constants.	C	V	T	Variables.	C	V	T	Variables.	C	V	T
Cons. time D.	0.703			Cores to con. tray	0.085		*0.085*	Place clamps D.	0.18		
,, ,, A.	0.250		*0.250*	Tuck W.H/S 10 cub.in. D.		0.057		,, ,, A.	0.14		*0.140*
,, ,, S.	0.103			,, ,, ,, A.		0.025		,, ,, S.	0.09		
V. time 10 sq. in. D.		0.037		,, ,, ,, S.		0.025		Draw loose pieces ea.	0.01	0.060	
,, ,, ,, A.		0.018	*0.126*	Part box 10 cub. in. D.				Clean bench	0.05		*0.050*
,, ,, ,, S.		0.013		,, ,, ,, A.	0.045	0.012	*0.309*	Place plate 10 sq. in.	0.035	0.003	*0.056*
V. time 10 cub. in. D.		0.0122		,, ,, ,, S.				Roll over 10 sq. in.	0.050		*0.050*
,, ,, ,, A.		0.020	*0.440*	Flat ram 10 sq. in. D.	0.075	0.007		Rap and draw 10 sq. in.	0.100	0.010	
,, ,, ,, S.		0.013		,, ,, ,, A.	0.075	0.007	*0.124*	,, ,, ,, A.	0.050	0.007	
				,, ,, ,, S.	0.040	0.006		,, ,, ,, S.	0.020	0.003	
				Place irons each D.	0.060	0.120		Get and place drier	0.080		
				,, ,, ,, 2A	0.020	0.100	*0.220*	Place and draw vent 1		0.100	*0.100*
				,, ,, ,, S.	—	0.050					
				Set on plate each D.	0.075	0.020					
				,, ,, ,, ,, A.	0.050	0.015					
				,, ,, ,, ,, S.							
								Brought forward			*1.554*
				Brought forward			*0.816*	Total Time			*1.950*
Total forward			*0.816*	Total forward			*1.554*	*1.95* at *50* min. P/H. Cores P/H			*25*

der the following headings and in chrono-
'der.
–Time study sheet.
–Summary chart.
Typical graph (required for each element).
–Summation of facts from graphs.
–" Element Standards " job card.

d Standards "

Classified Standards," a modified version
1 is shown on time study sheets (Table 5),
rking graph (Fig. 2).

Complexity Classification

from the common denominator of time
ich is vital to both techniques, it will be noted from the examples that terms of complexity classification (namely—simple, average and difficult) are used in both instances. There is a difference in application, however, these classifications being applied only to either individual or small groups of elements of repetition work, whereas the total cycle of operations is given a single classification for jobbing work.

CHALLENGE TO MANAGEMENT

Space does not permit of further explanatory details of the establishment of predetermined standards of time, or of the use made of time studies to determine percentage allowances for normal delay time and self-service time. These two factors should have been reduced to a minimum as a result

TABLE 5.—*Time Study Sheet, Long Cycle (Classified Standards).*

DAC *Operation* Male. Coremaking Main Shop *Date* 19.1.54 *Dept.* Core Bay
998 *Client* Min. Supply *Drg.* *No. in Box* 1 *Cores*
x 41 by 41 by 4 in. deep. *Volume* 6,315 cub. ins. *Area* 1,680 sq. ins. *Class* Average
Loose Pieces *Gaggers*
Chaplets *Type*
ith *Helper* None Effort Good. *Start* 2.29 *Stop* 3.08 *Elapse* 39 min.

Elements.	min./sec.	*Elements.*	min./sec.	
sand (6)	1.00	Level sand and bed down	1.10	
and	35	Flat ram	1.14	
nate bend bar	60	Strike off	1.67	
sand and bed down	45	Jab vent (50)	35	
rigs	12	Draw 2 d. sprue	14	
sprigs 23	73	,, 2 ,, ,, ...	16	
sand round (17 bosses)	70	Remove junk from Pl.	84	
and (pin)	95	Lock and get 2 hooks	75	
sand (pin) (4)	40	Cut 2 for lift. Eyes	70	
sand and build up to box side	95	Wait for crane	8.00	
and (pin)	53	Lift plate with crane	90	
to wash grate. 10 paces	1.09	Lower on box with crane	60	
ve wash away	10	Set chains to r./o.	1.20	
to Box w./h.	10	Lift all W. Crane and		
ate	20	r./o.	1.00	
own with bar	31	Remove chains	23	
sand (7)	70	Rap box	44	
out and fix	75	Draw box w./h.	20	
and (pin)	3.75	Draw r. bar 1	24	
sand (5)	60	,, ,, ,, ...	10	
sand	36	Finish core	20	
and (pin)	2.25	Stamp 8 numbers	50	
sand (2)	17	Lift w. Crane and away	65	
sand	19			
nate draw	30			

Actual job time .. .. .. 30 min.
Delay time .. .. .. 9 min.
Service time .. .. .. —

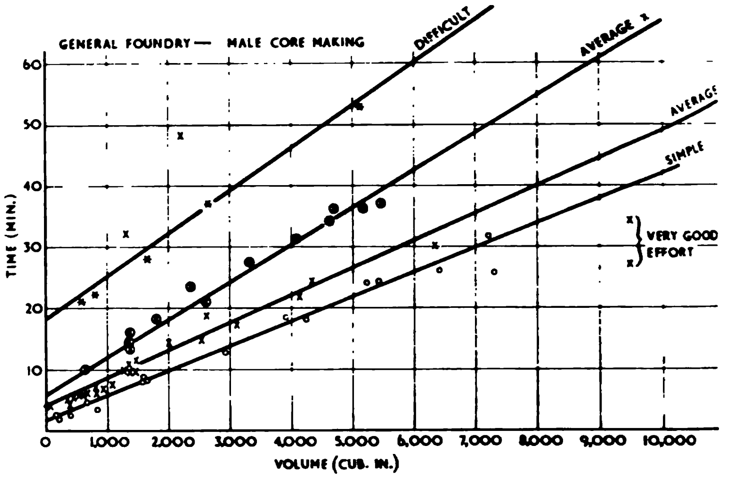

Fig. 2.—*Typical working graph for the establishment of "classified standards." This example concerns coremaking in the general foundry (male labour), for which the results are referred to four degrees of complexity.*

of earlier motion studies, but it is doubtful if any jobbing foundry can function entirely without either. Allowances such as these, however great or small, are a positive loss in potential productivity, and in consequence offer a distinct challenge to supervisory staff and management. Personal allowance is a must, and the proportion of time offered per hour or day is strictly a matter for joint consultation between trade union representatives and management.

CONCLUSION

The work of a standards department should never completely stop, but a stage can be reached when either "Element Standards" or "Classification Standards," or both, have been established and accepted. This state of affairs is one of the most important milestones in the life of any foundry, for it can then be boasted that estimates of time are no longer "guestimates," and that the tools have been provided for control of all costs associated with time.

British Progress in Shipbuilding

Press conference to hear the impressions of a British shipbuilding productivity team, composed of employer and trade union representatives, which has just returned from Sweden, was held in London last week. Mr. C. Stephenson, director and general manager of Hawthorn Leslie (Shipbuilders), Limited, Hebburn-on-Tyne (Co. Durham), and Mr. E. J. Hill, general secretary of the United Society of Boilermakers, agreed that British shipbuilding was no whit behind Sweden in technical advancement. On labour matters there was some divergence.

Mr. Stephenson pointed out that Sweden had only one union and that there was "complete flexibility of labour" with no difficulty in switching a man from one job to another. Sweden had no strikes because disputes were settled before strike action threatened. Mr. Hill thought the number of demarcation disputes in British yards would be less if foremen were consulted at the planning stage about the distribution of work, as was done in Sweden.

The team agreed that one reason for Sweden's greater productivity was that British yards operating with full order-books since the end of the war had had to modernize more slowly in order not to disrupt production programmes and Swedish yards are not so cramped for space to expand.

Other members of the team were Mr. George Barratt, general secretary of the Confederation of Shipbuilding and Engineering Unions, and Mr. Norman Sloan, director of the Shipbuilding Employers' Federation.

The 10,673-ton tanker El Morro is to be broken up by the Hughes Bolckow Shipbreaking Company, Limited, a Metal Industries group subsidiary, at Blyth (Northumberland). It is the third tanker to be allocated to the Blyth breakers in recent weeks: the other two were the Fort Stevens (10,639 tons) and the Omala (6,244 tons).

Truth about Company Directors

A random sample to find out just how the average company director spends his working day has been taken by the medical research unit of the Institute of Directors. Questionnaires were sent to 5,000 of the Institute's 32,000 members and replies were received from 61 per cent. of the sample. The lie is given to a good many popular conceptions of the company director.

Once at the office, 90 per cent. spend three quarters of their time in executive work outside the boardroom; more than two out of three are at work by 9.30 a.m. and get there mainly in cars, 94 per cent. being owner-drivers. A fifth rely on public transport.

Last year three quarters took holidays of three weeks or less; about a third lunch at work, either in the canteen or in a staff dining room. The "business lunch"—entertaining or being entertained—occurs twice a week or less for about 60 per cent.

Only 10 per cent. have never smoked; another 15 per cent. recently gave it up. The rest smoke regularly. Only 30 per cent. admit to smoking even an occasional cigar. Forty per cent. take exercise every day.

Only 16 per cent. of those questioned are directors of four or more companies. More than half are concerned exclusively with one company and its main subsidiaries. Well under 10 per cent. work less than a full day. Some 64 per cent. depend upon experience alone; only 14 per cent. have a university degree.

The investigation is part of a long-term research programme to define the occupational hazards of executive life.

According to the 1958 report on Netherlands New Guinea, submitted to the United Nations by the Netherlands Government, the Administration of the territory expects that in the near future a start will be made on the mining of proven deposits of nickel, cobalt and iron ores in the Cyclops Mountains and on the island of Waigeo.

undry Trades' Equipment and Supplies Association

Annual General Meeting

nnual general meeting of the Foundry Trades'
nt and Supplies Association was held on
27 at the Waldorf Hotel, London, Mr. Gavin C.
presiding. The minutes of the meeting held
ber 29, 1958, having been adopted, the balance
s presented. The annual report of the Council
ct of the year ended December 31 was then
d and is set out below:—

ship

g the year 1958, seven new members were
making a total membership of 88 at Decem-
at no time since the formation of the Associa-
1925 has this number been exceeded. Neverthe-
Council is conscious of the fact that there are
umber of companies who have not yet joined
rts will continue with the object of achieving a
ship strength which will be fully representative
ndustry.

ts

ccounts of the Association for the year ended
er 31, 1958, showed an excess of expenditure
ome amounting to £4 12s. 11d., and including
nce at December 31, 1957, there was a total
f £154 8s. 4d. During both these years, the
ion incurred additional expenditure on matters
to the Foundry Exhibition which amounted to
s. 3d., and this will be recovered from the
on account.

bers were informed of the death of Mr. D. H.
nd of Mr. T. A. Hammersley, both of whom
ved for many years on the Council and com-
of the Association. During the year, eight
s of the Council were held and when necessary
s have been kept informed of events.

of President and Council

mber of members submitted proposals on this
and subsequently an extraordinary general
was held on September 2, 1958, at which a
e-law was ratified to supersede the previous
dated September 13, 1945. This has the effect
ing a vacancy on the Council every one or two
reason of the fact that retiring presidents now
ex-officio members of the Council for specified

ir Act, 1956

e result of this Act, the ironfoundry industry
cular was presented with a number of difficult
s relating to atmospheric pollution from
. Following discussions between interested
s of the Association and the Council of Iron-
Associations, a joint meeting was held with
l organizations of local Governments in an
ur to obtain some uniformity of approach to
blems which had to be overcome.

mping Duty Committee

committee was formed following an applica-
ing made to the Board of Trade for the imposi-
an anti-dumping duty on maize and milo
imported from the Netherlands. A protest
this was made by the Association. Subse-
the Board of Trade decided that a case for
g such a duty had not been made out.

y Exhibition

exhibition committee continued to meet at frequent intervals to consider the matters relating to the Foundry Exhibition, sponsored by the Association, which took place at Bingley Hall, Birmingham, in May, 1959. The Council wishes to record its appreciation of the work of the committee, the members of which have contributed so much of their valuable time on this successful project. Also, the members wish to pay a warm tribute to Mr. Barrington Hooper for his help and guidance, and for providing without cost to the Association 2,000 spiral-bound copies of the special issue and catalogue published by the FOUNDRY TRADE JOURNAL which were sold at the Exhibition.

Association Handbook

Over 900 copies of the third edition of the "British Foundry Plant and Supplies Handbook" were despatched to foundries overseas and to UK embassies throughout the world.

Borough Polytechnic

Mr. Gavin C. Paterson was nominated as the Association's representative to serve on the foundry advisory committee of the Borough Polytechnic.

University of Birmingham

Members of the Association responded to an appeal issued by the University for the loan of certain foundry equipment required in connection with their new graduate course in foundry science and engineering.

Institute of British Foundrymen

Members of the Association contributed a total of £384 1s. 0d.. towards the expenses of the 1958 conference of the Institute of British Foundrymen.

National Union of Manufacturers

Mr. C. Orton Foster was appointed as the Association's representative to serve on the Executive Council of the National Union of Manufacturers.

Association Dinner

The Council wishes to record its appreciation of the work of the dinner committee which resulted in a very successful dinner at the Savoy Hotel. From the excellent attendance of members and their guests, it is now clearly apparent that this has become an annual event.

Further Proceedings

After the formal business had been transacted, the meeting decided in principle that the next exhibition would be held, as a national exhibition, in 1963 in Birmingham. The profit on this year's Exhibition is to be placed to the credit of a trust fund to be available for financing the next one. The members unanimously agreed to raising the annual subscription to £21, as for some years losses had been incurred on operating the Association. From Mr. J. P. P. Jones, of W. J. Hooker & Company, Limited, came a proposition that the members of the Council, especially the exhibition committee, should be accorded the warmest thanks of the general members for the great amount of voluntary work that they had put in to assure the success of the Exhibition. This was warmly endorsed by the meeting. Mr. Frank Webster proposed, and Mr. V. C. Faulkner seconded, a vote of thanks to the chairman and president (Mr. Gavin C. Paterson), for his conduct of the day's meeting, and for the successful work he had put in for the benefit of the Association during his year of office.

At a Council meeting which followed, Mr. Gavin Paterson was re-elected president for a further term of office; Mr. V. L. Cashmore (British Moulding Machine Company, Limited), and Mr. B. N. S. Perry (G. Perry & Sons, Limited) were co-opted to the Council.

Rapier Walking Dragline for Alberta

Placed with Ransomes & Rapier, Limited, Ipswich, by Calgary Power, Limited, Alberta, an order for a large electrically-driven walking dragline is the first contract for this type of machinery placed in this country for delivery to the North American Continent. Won in the face of fierce American competition, the contract is worth $1,500,000 (approx. £500,000).

The order is for a machine recently introduced into the RapieR range of walking draglines, which are designed specially for open-cast mining operations. Known as the RapieR W1350, the machine weighs 1,400 tons and will be equipped with a 33-cub. yd. bucket capable of carrying 50 tons of material at a time at a radius of 215 ft.

After being manufactured at Ipswich, the dragline will be dismantled into suitable units and shipped to Canada *via* Vancouver and then taken through the Rockies by rail to the assembly area at Wabamun, near Edmonton. It is expected to be working by the middle of 1962 and will be used for removing overburden on top of 750,000 tons of coal required each year for power stations in the vicinity.

The very low temperatures in which the dragline must work in the winter—82 deg. of frost has been recorded in the area where the machine will be working—sets many interesting problems of design and construction. Special steels will be used to meet the conditions.

Eighth SIMA Convention

The Eighth Annual Convention of the Scientific Instrument Manufacturers' Association, organized by a committee under the chairmanship of Mr. W. A. Jones, Fleming Radio (Developments), Limited, took place at the Hotel Metropole, Brighton, on October 22 to 24, under the presidency of Mr. L. A. Woodhead, Cossor Instruments, Limited. There was a record attendance of members, over 70 firms taking part, and a number of distinguished visitors also attended.

The theme of the Convention was "Instruments of Destiny" and the subjects were dealt with by four panels under the headings of "Instruments of the Future," "Future Materials and Production Techniques," "Organizing for the Future," and "The Individual and the Company." The discussions covered the Nuclear Age, the Space Age, and the conditions, technology, instruments and components that would be needed in the future, including such purposes as ballistic missiles, and satellites. The organizational, marketing and financial needs of the forward-looking company were covered, and a number of subjects from the aspect of the individual in regard to such things as health, financial rewards, pensions, etc., were dealt with.

In addition a number of social events were fitted in, and an enjoyable reception and dinner/dance at which the Mayor of Brighton, Alderman E. W. Kippin, J.P., was present, was held in the Hotel Metropole.

Latest Foundry Statistics

Ironfounding:—According to figures released by the Council of Ironfoundry Associations there was a total of 124,009 people employed in ironfounding at the week ending August 29, an increase of 1,320 over the figure for August 1. At the end of August last year there were 130,725 workers employed in the industry.

Film Reviews

Sparkling Performance (27 min.); **In the H**
(27 min.); and **In the Rough** (30 min.)—a
without charge in 16 mm., sound and colo
the films department, Carborundum Co
Limited, Trafford Park, Manchester 17.

The Carborundum Company, Limited, showe
of their instructional films for industry to the
London last week. The first, entitled "Sparkli
formance," dealt with the use of diamond abra
industry. A dramatized opening sequence exp
the enormous value of industrial diamonds
present-day engineering, stone and glass trades
second presentation was "In the Hot Zone," w
claimed to be the only film in existence whic
with the subject of industrial heat-control by
refractory materials. To the layman this wil
real revelation whilst even the furnace or
expert will find it highly instructive and of ab
interest. This film was easily the most spectac
the trio presented—the grandeur of glowing f
and molten metal being exceptionally well por

Finally came "In the Rough," which proved
an interesting study of the rôle which has been
by modern abrasives in the development of f
and other heavy-engineering techniques. This fil
at once dramatic and entertaining, the expert
graphy being backed by a drily-humorous comm
A seemingly prosaic subject was shown to
reality, packed with colour and human interest.

British Standards Institution

The first part of a new British Standard for
ment castings in metal, B.S. 3146:Part 1:1959, n
published by the British Standards Institution,
with castings made from carbon- and low-alloy
further parts to be published later will dea
higher-alloy and special-temperature steels. C
of the type specified in this new publication are
where manufacture involves the investment of
pendable pattern by refractory slurry: castings
shell-moulding process are thus excluded fro
scope of this standard.

Section one of the standard surveys general r
ments and specifies the process of manufactu
method of identification of the casting, the pro
for testing both mechanically and by dest
methods and the arrangement necessary for re
castings. Section two provides specific requir
for 12 different types of casting, many of whi
sub-divided into two or three grades. The ch
composition and mechanical properties of each t
casting are detailed.

Copies of this standard may be obtained fro
British Standards Institution, sales branch, 2,
Street, London, W.1; price 6s. (Postage will be c
extra to non-subscribers.)

The Institution also announces that a draft sta
A (SFE) 1364 for Simplified Methods for Measur
of Grit and Dust Emission has now been issue
comment, and requests that comments should be
mitted not later than February 13, 1960.

IBF Head Office move to London

The actual transfer of the head office of the Ins
of British Foundrymen from Manchester to 14,
Mall, London, S.W.1, is to take place over the
end commencing Friday, November 13, and c
pondence to arrive on and after Monday, No
ber 16, should be sent to the new address. The
telephone number is to be WHitehall 7141-2.

Section devoted to the technology of producing
DIMENSIONALLY
ACCURATE
CASTINGS

Properties of Cobalt-base Investment-cast Alloys[*]

By M. Riddihough, M.Met., A.R.I.C., F.I.M.

General comments on the early days of investment casting are made first. These are followed by a detailed description of the mechanical properties of the cobalt-base alloy X40. The final section is devoted to abrasion-resistant cobalt alloys, and the difficulties of assessing wear resistance.

In its early days the investment-casting process was used to produce single pieces of statuary in expensive alloys, and its adoption by the dental, surgical and jewellery professions during the present century has led to quantity production, still in expensive metals. However, it was the development of the casting of gas-turbine blades in large quantities which brought the process into the engineering field to such an extent that the cheapest metals are now handled economically by investment casting, when circumstances warrant. Since the engineering process was developed using a particular class of alloy, *i.e.*, the cobalt-base metals for high-temperature use, this section will be covered first.

TABLE 1.—*Percentage Compositions of Various High-temperature Cobalt-base Alloys.*

—	C.	W.	Mo.	Cr.	Ni.	Fe.	Si.	Mn.
Vitallium AMS 5385 .. Stellite 8 or 21.. ..	0.2/0.3	--	5/6	25/29	1.75/3.75	3 max.	1 max.	1 max.
Stellite 7 or 23 .. AMS 5375	0.35/0.45	4/6	1 max.	23/27	0.5/3	2 max.	1max.	1 max.
X-40 Stellite 31 .. AMS 5382	0.45/0.55	7/8	--	24.5/26.5	9.50/11.5	2 max.	1 max.	1 max.
X-40 (see Figs. 1-3)	0.47	7.26	—	25.52	10.96	0.45	0.35	0.25
X-40 (see Table 2)	0.49/0.51	7.0/7.3	—	24.2/25.2	10.4/12.6	0.81/1.1	0.54/0.63	0.08/0.14

Work done by Rolls-Royce

When Rolls-Royce, Limited, took over the production of gas turbines during hostilities, they decided to use the investment-casting process for the production of nozzle guide-vanes, in view of the successful use of this process in the USA, on a similar project, *i.e.*, the Boeing exhaust supercharger buckets. The manager of the Rolls-Royce foundry in Glasgow, Mr. John Vickers, went to America to obtain details of the Austenal process, and on his return he demanded a supply of cobalt-base alloy ingot, then known as Vitallium, for recasting. This alloy is of course virtually the same as the one which is used by the surgeons for implants in the human body, and by the dentists for denture plates. The present-day specification of this alloy is "Stellite" 8 in England, 21 in the USA, and is shown in Table 1. The addition of nickel was made to reduce ageing embrittlement, as in the USA a large proportion of the alloy was used in rotor blades, whereas in the UK the alloy

TABLE 2.—*Stress-rupture versus Temperature Figures for Four Casts of X40 Material.*

Cast.	Temperature of test.	Load (tons/sq. in.) to produce rupture in				
		100 hr.	300 hr.	500 hr.	750 hr.	1,000 hr.
A	700 deg. C.	21.5	19.4	18.4	17.5	17.0
B	800 deg. C.	13.6	11.8	11.0	10 1	9.7
C	900 deg. C.	7.5	6 3	5.9	5 3	5.0
D	950 deg. C.	6.5	5.0	4.2	3.8	3.2

(*Courtesy: Bristol Aero-Engines, Limited*)

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[*] Another instalment of the series of papers presented at the first annual conference of the British Investment Casters' Technical Association (held at Connaught Rooms, London, on May 11 and 12). The author is on the staff of Deloro Stellite Limited, Shirley, Solihull, Warwickshire.

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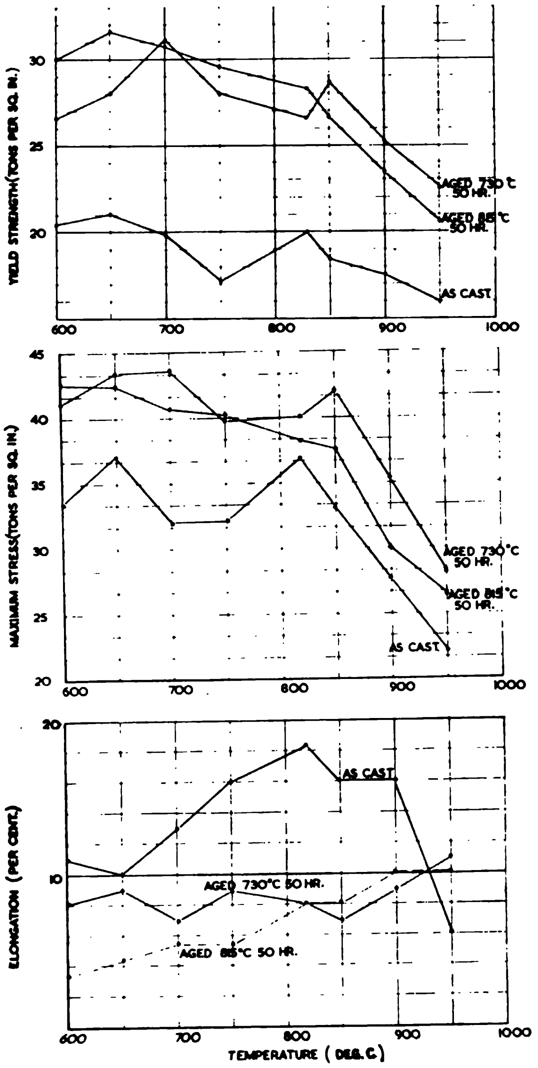
has been confined to nozzle guide-vanes. At the end of hostilities, Rolls-Royce found that adequate properties for their engine were obtained from lower-alloy material, and they changed to HR Crown Max. However, subsequent engine development has called for higher temperatures and stresses, and in recent years cobalt-base alloys have again come into favour with some engine manufacturers.

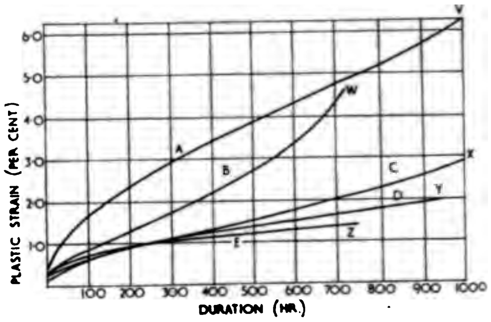
Recent Developments

An alloy which was originally used quite extensively is a variation known as "Stellite" 7 (see Table I), in which molybdenum is replaced with tungsten. However, in the last few years X-40 has come to the fore, and it is now the only cobalt-base alloy used to a large extent. Besides good high-temperature properties and resistance to thermal shock it has excellent casting qualities, and is often used in the production of castings which are difficult to make in other types of high-temperature alloy. In giving this paper the Author's aim has been to present typical properties of X-40 as found on production. He has been able to draw on information kindly provided by the engine firms, to whom acknowledgment is made for the illustrations.

FIG. 1.—*Mechanical properties of the cobalt-base alloy X40.*

(*Courtesy: D. Napier & Sons, Limited*)



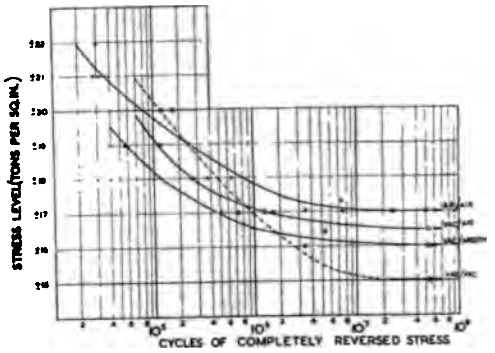


(*Courtesy: D. Napier & Sons, Limited*)

FIG. 2.—*Short-term creep properties of Deloro X40 alloy (DNS 216), air melted, air cast, aged 50 hr. at 815 deg. C.*

A—13 tons per sq. in., 750 deg. C.
B—23 ,, ,, ,, 650 ,,
C—20 ,, ,, ,, 650 ,,
D—15 ,, ,, ,, 700 ,,
E— 8 ,, ,, ,, 815 ,,

V—Rupture at 1,031 hr., 6.45 per cent
W— ,, 718 ,, 4.66 ,, ,,
X— ,, 1,489 ,, 5.64 ,, ,,
Y— ,, 935 ,, 1.94 ,, ,,
Z— ,, 746 ,, 1.44 ,, ,,



(*Courtesy: D. Napier & Sons, Limited*)

FIG. 3.—*Limiting fatigue stress, at a test temperature of 850 deg. C., of X40 alloy (aged 25 hr. at 815 deg. C.).*

TYPICAL PROPERTIES OF ALLOY X40

Percentage Composition

The specification in Table I is a relatively wide one, which can be held without difficulty in practice with either high-frequency or arc-melting in the investment foundry. Ingot for arc-melting is usually of lower carbon content, to allow for a little pick-up during re-cycling, and the only other element which may vary is the iron content if there is any contamination due to shotblasting. Providing the metal is not overheated above 1,600 deg. C. it does not become dirty in melting, and it can be re-cycled if adequate control is kept on carbon and general analysis.

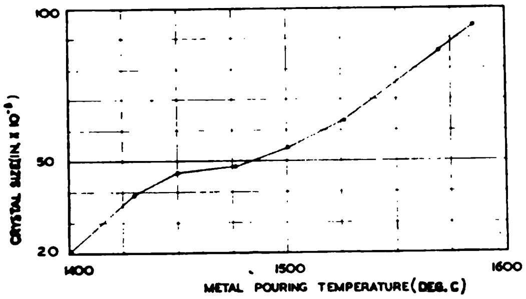
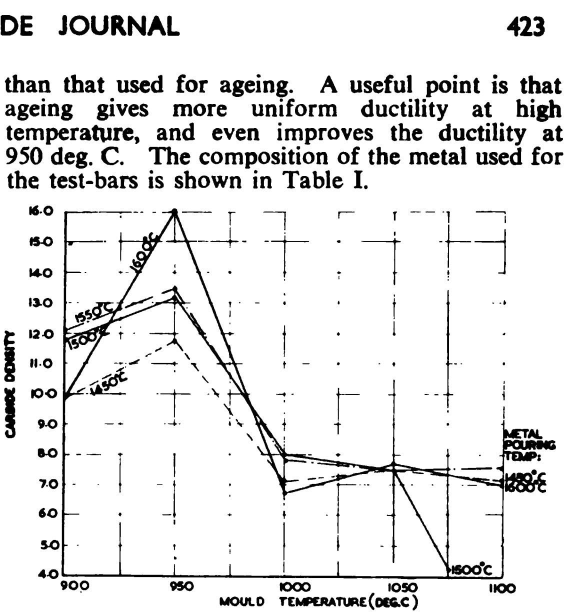


FIG. 4.—*Graph of crystal size* versus *pouring temperature, for a cobalt-alloy (Stellite 6) casting of ½-in. square section by 3½ in. long, made in a sand mould.*

Tensile Strength

Fig. 1 illustrates the tensile strength (cold and hot), and the effects of ageing. A considerable improvement in yield strength is given by ageing, and this remains effective at temperatures higher than that used for ageing. A useful point is that ageing gives more uniform ductility at high temperature, and even improves the ductility at 950 deg. C. The composition of the metal used for the test-bars is shown in Table I.



(*Courtesy: Bristol Aero Engines. Limited*)

FIG. 6.—*Graph of carbide density* versus *mould temperature, for a series of test castings of X40 alloy.*

Stress Rupture and Short-time Creep

Investigations of stress-rupture performance by three different companies show a good level of agreement, as illustrated in Tables 2 and 3 and Fig. 2. As a test of the uniformity of results obtained in production a series of investment melts was made at five different metal-pouring temperatures, and four mould temperatures from 950 to 1,100 deg. C., *i.e.*, a total of 20 melts. A stress-rupture bar was made with each melt and tested at 900 deg. C. and 9 tons per sq. in. In the 20 results obtained the minimum time to rupture was 24 hr. and the maximum 106 hr., with an average of 46.3 hr.

Fatigue

The limiting fatigue-stress at temperature is illustrated in Fig. 3, from which it appears that vacuum-melting or casting does not improve the fatigue properties at high temperature.

Cast Structure

The crystal size obtained in a

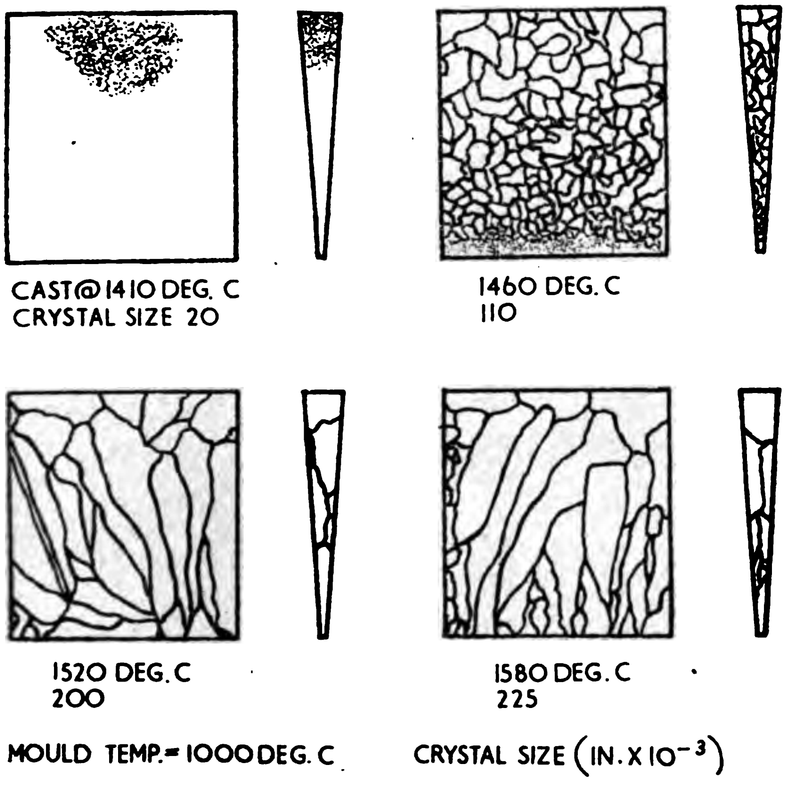


FIG. 5.—*Relationship of crystal size to pouring temperature, for a "dummy" blade* investment-cast in X40 material.

Cobalt-base Investment Alloys

given casting depends on the pouring temperature of the metal and the temperature of the mould. This relationship is relatively easy to prove on a laboratory scale, and Fig. 4 shows typical results obtained on a cobalt-alloy casting ½ in. square by 3½ in. made in sand. Similarly, a dummy blade investment-cast in X-40 gives the relationship of crystal size according to casting temperature shown in Fig. 5. However, such a close correlation is not easy to find in practice when casting a batch of blades in an investment mould. A large amount of metal is poured into a mould down a central runner, and as the mould tilts some blades are downpoured and others bottom-poured[1]. There is a wide variation in method of entry of molten metal into each cavity, and probably a wide variation in individual metal temperatures even though the metal was poured at the one temperature.

TABLE 3.—*Further Stress-rupture* versus *Temperature Figures for X40 Metal.*

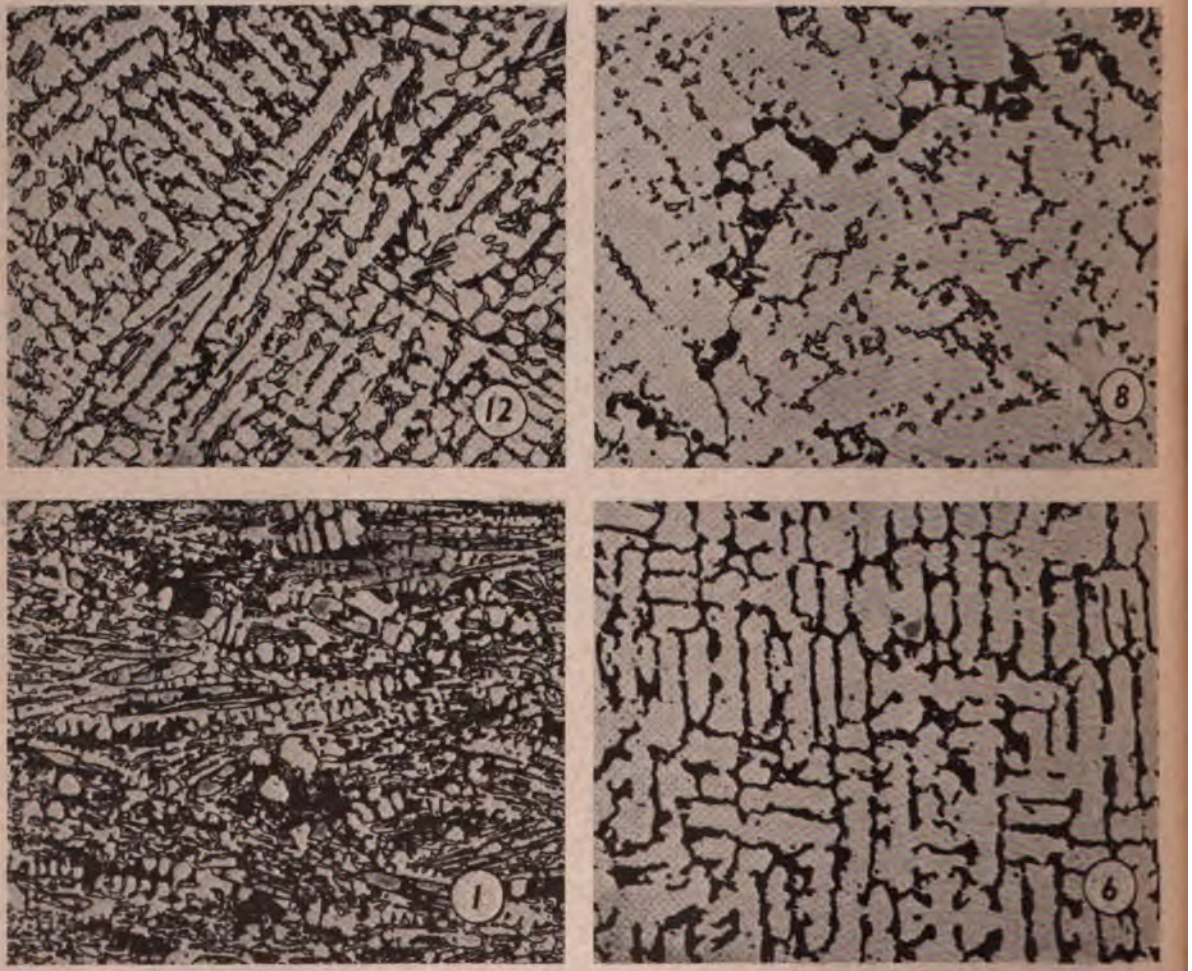
Temperature of test.	Load (tons per sq. in.) to produce rupture in		
	30 hr.	100 hr.	300 hr.
700 deg. C.	24—26	19—24	18—22
750 deg. C.	18—20	16—19	14—17
800 deg. C.	13—16	11—14	10—13
850 deg. C.	10—13	9—12	8—10.5
900 deg. C.	8—10	7—9	6—8

(*Courtesy: de Havilland Engine Company Limited*)

TABLE 4.—*Percentage Compositions and Hardnesses of Standard Wear-resisting Cobalt-base Alloys.*

Grade.	Hardness.		Composition (per cent).				
	Diamond Pyramid.	Rockwell "C."	C.	W.	Mo.	Cr.	Co.
1 ..	600	54	2.5	13	—	33	50
12 ..	500	48	1.8	9	—	29	58
6 ..	400	40	1.0	5	—	26	65
8 or 21..	325	33	0.25	—	6	30	62

FIG. 7.—*Carbide structures of the alloys listed in Table 4, where the respective hardnesses are quoted (grade numbers in circles).*



Relationship between Carbide Density and Mould Temperature

As an illustration of this, tests were carried out by one engine company in which a series of moulds were poured at five different mould temperatures and four different pouring temperatures, *i.e* a total of 20 melts. The investigations included analysis, stress-rupture tests, elongation, grain-size counts and determination of the carbide density. No relationship was apparent between the stress rupture, elongation and grain-size, and the metal or mould temperature. However, a relationship was evident between the carbide density and the mould temperature, as shown in Fig. 6. The author's own experience of general foundry practice with cobalt-base alloys is that a controlled uniform grain-size and carbide density throughout the casting is conducive to better corrosion resistance and thermal shock resistance. Dr. N. Grant[2] went even further, and claimed a close correlation between grain-size and rupture life.

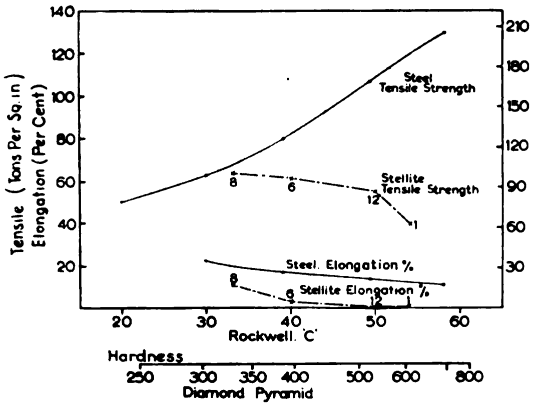


FIG. 8.—*Graph comparing the tensile strengths in tons per sq. in., and elongations per cent. (at 20 deg. C.), of steel and Stellite at various hardnesses.*

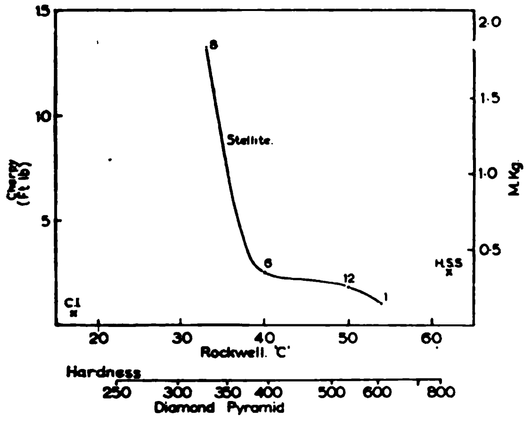


FIG. 9.—*Impact strength of Stellite (charpy (ft. lb. or M. Kg.), "V" notch at 20 deg. C.), compared with points for cast-iron and high-speed steel.*

The author makes no apology for dwelling at some length on high-temperature alloys, because the lessons learnt from them are applicable to other metals, and also because there is a growing field for their use in commercial high-temperature components such as super-charger rotors and small commercial gas-turbine rotors.

ABRASION-RESISTANT COBALT-BASE ALLOYS

The second half of this paper is concerned with cobalt alloys used for abrasion resistance. In many instances abrasion is accelerated by corrosion and heat, and the author now tries to compare the cobalt alloys with the normal commercial steels to get them into perspective. Table 4 illustrates the composition and hardness of the alloys which have been standardized for many years. The high-carbon and high-tungsten composition (grade 1) contains most carbide in the micro-structure, as shown in Fig. 7, and in general has the greatest wear resistance. Naturally, the greater hardness is accompanied by less ductility and, contrary to steel, the tensile strength also diminishes, as shown in Fig. 8. This means that whilst the softer grades 8 and 6 have very good strength (of the order of 55 tons per sq. in. as cast), the harder grades must be supported if subject to heavy load. For instance, extrusion dies of cast cobalt alloy are supported in a tool-steel bolster hardened to 90 to 100 tons per sq. in. The impact strength at room temperature is adequate, as shown in Fig. 9, and the hard grade-1 alloy is still less brittle than good quality cast-iron. Fig. 10 indicates that a grade can usually be chosen that has an equivalent corrosion resistance to that of stainless-steel.

Assessing Wear Resistance

Wear resistance is not a property which can easily be assessed. Many tests have been done to copy service conditions, but it is still only possible to estimate wear under a set of new conditions by comparing past experiences. However, as the cobalt alloys are resistant to all three factors which bring about wear, *i.e.* heat, corrosion and indentation, they fill a field where resistance to two or more of the above conditions is required, in contrast to structural metals (such as stainless-steel and cast-iron) which are used for simple corrosion or abrasion resistance.

All the data which have been given apply to the alloys in the as-cast condition. No subsequent heat-treatment is carried out, although prolonged heating at 800 to 1,000 deg. C. causes age-hardening to the extent of up to 10 per cent. of the original hardness. The alloys are not softened by an annealing treatment or heating to any temperature below the melting point, and it has not been found that stress-relieving treatment is normally necessary for investment castings.

CONCLUSION

In conclusion, it is suggested that investment founders remove some of the remaining variables in their processes, by controlling the method and

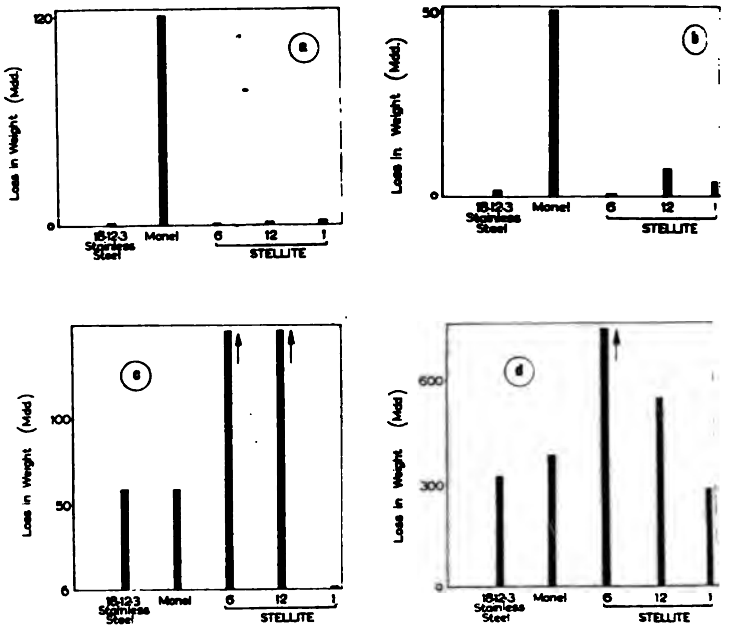


FIG. 10.—*Comparison of the corrosion resistance of Stellite, Monel and stainless-steel to* (a) 20 *per cent. nitric acid;* (b) 20 *per cent. acetic acid;* (c) 30 *per cent. sulphuric acid, and* (d) 20 *per cent. hydrochloric acid.*

rate of flow of the metal into the individual mould cavities, in the same manner that mould- and metal-temperatures are controlled.

DISCUSSION

Following the presentation of Mr. Riddihough's paper, the CHAIRMAN, Mr. G. A. Tomkinson (D. Napier & Son, Limited), said that it seemed to him that there were some materials which could be air cast, despite Mr. D. R. Wood's warning, in his paper, that vacuum melting and vacuum casting would have to be used eventually.

Hot Moulds, or Cold?

MR. WALKER (Hadfields, Limited), said that work done by Bristol Aeroplane Company, Limited, on mould temperature, had given a range of 900 to 1,100 deg. C.; and asked if any work had been carried out on lower mould temperatures, and if there was any virtue in attempting mould temperatures of, say, 600 or 700 deg. C. with these alloys.

MR. RIDDIHOUGH replied that it was always better to get moulds as cold as possible, because that would result in a smaller grain-size, as well as smaller dendrite size, in the casting. If there was too much chill (referring to room temperature and even to chilled moulds), then there was a variation over the cross-section of the casting because of the very high rates of cooling. The shell moulding process gave a very even grain-size, but the cooling rate compared with ordinary sand casting was slowed down by what was, presumably, a gas film. However, the cooling rate was not as slow as in an investment mould heated to, say, 500 or 600 deg. C.

MR. J. HENDRY (Preformations, Limited) then said that his firm was one of the only remaining concerns still casting Vitallium or Stellite 8, and that they periodically ran into the question of carbide segregation. With regard to Fig. 6, in Mr. Riddihough's paper, in their experience the opposite was true regarding mould temperature and carbide density. When keeping their mould temperature to a minimum and maintaining high melting temperature, they seemed to have less trouble.

MR. RIDDIHOUGH said here that his firm measured the distance apart of the arms of the dendrite by using a graticule on the microscope, and varied the magnification until the structure matched the graticule, so obtaining a measure of the dendrite spacing. It was this structure which was sensitive to mould temperature. With a chill mould an extremely fine carbide spacing was obtained; with a very hot mould, a very coarse carbide spacing was obtained. Mr. Hendry's problem might, however, be a rather different one, which was still being investigated at Mr. Riddihough's firm.

MR. A. DUNLOP (W. J. Hooker, Limited) then stated that, regarding Mr. Riddihough's reference to the use of a cold mould, he thought it was one of the secrets of sound investment-casting to use a hot mould, which contributed something to the feeding of the castings which was not obtained in sand moulds. Mr. Dunlop then asked whether Mr. Riddihough had investigated any other method of grain control, such as inoculation, and said that it was quite common practice in light alloys and, to some extent, it had also been done on iron-base alloys of the HR Crown max type. It was possible to treat the mould surface with an inoculant which would refine the grain, and to cast at the same high temperature and obtain a very fine grain size, he concluded.

MR. RIDDIHOUGH answered by saying that his firm had indeed carried out experiments on inoculation with a very fine powder, and had had some success using aluminium painted on to the mould surface, but it did not seem to extend right through a casting about half an inch thick. It had had some effect, but not enough to warrant them persisting with the process. Mr. Riddihough continued that he did not agree with the view that the hot mould was necessary for making sound castings, because all the standard BS test-pieces of four times the square root area, or 5.6 times the square root area, could be cast in cobalt-base alloys at room temperature to give a perfectly sound casting in ordinary types of sand mould.

MR. DUNLOP then said that that view referred only to a simple casting, and that, when making a complicated casting, distortion or cracking were often obviated by the use of a hot mould. Turbine

s with thick and thin aerofoil sections would
storted if cast in a cold mould, he added.

. **Riddihough** replied that, for really compli-
shapes, temperatures of 800 or 900 deg. C.
needed in any case.

y Correlation between Carbide Density and Mould Temperature ?

. R. **Taylor** (Firth-Vickers Stainless Steels,
ed) entered the discussion at this point, by
; that he was very puzzled and intrigued by
in the paper. Since he first saw this graph,
d been repeatedly looking at it, and there was
one way in which he thought one could try
erpret it, and that was in terms of heat
it, conductivity, diffusivity and so on. It
appear, he said, that above a mould tempera-
of 1,000 deg. C., with one exception, all these
ıgs were very much the same, between 7 and 8
e density, and that was irrespective of metal
ıg temperature, which varied over a range of
leg. C. From this part of the graph, it
red not to matter what the mould tempera-
vas, or what the metal temperature was, one
oing to get the same carbide density anyway,
was an ideal state of affairs if 7 to 8 was the
e density one wanted. However, if one
d to increase the carbide density, and, to
e this, lowered the mould temperature, there
peak at 950 deg. C.

Taylor continued that he thought these results
'ery "statistical" indeed, and might be due to
ndomness of the basic data. For instance, it
ighly probable that there was a very poor
ation between the actual metal structure
ıed and the temperature reading taken. He
ed that there was a platinum/platinum/
ım thermocouple buried in the mould; and
was a reading obtained from only one spot.
ıking in terms of heat-content effects, he
statistician would re-draw the graph in ques-
However, assuming that the four peak figures
) deg. C. were really statistically significant
ı fact, there was a peak there, how could one
ile that in terms of heat content? There was
eat in a mould at 900 deg. C. than in one at
eg. C., and if the more rapid chilling effected
mould at 950 deg. C. increased the carbide
v relative to conditions produced by a mould
)0 deg. C. or over, it was to be expected that
en cooler mould would have at least the
effect. Mr. Taylor then said that he could, in
vn mind, find an explanation for the relative
ty of the results obtained at varying metal-
ıg temperatures with mould temperatures at
deg. C. and hotter. He suggested that, under
conditions, there occurred, during the first
second of metal/mould-cavity contact (the
l material being comparatively insulating and
thermal conductivity and diffusivity, relative
tal), a heat-saturation effect of the skin of
ould cavity with the result that, for a signifi-
ime, there existed what one might call a state
rmal stagnation or near-equilibrium, in terms
e of heat dissipation from the cast metal to
ould. For example, a mould temperature of 1,000 deg. C. and over was sufficiently near to the metal freezing temperature for the actual heat-content of the metal to be comparatively unimportant because the skin of the mould cavity extremely rapidly reached the adjacent metal temperature, and variations in cooling conditions were, to a large extent, ironed out.

Below 1,000 deg. C., however, there was apparently a threshold value of heat-extraction by the mould, which gave that significantly increased chill to have an effect in terms of increasing the carbide density. He could not, however, see why going progressively below 1,000 deg. C. mould temperature one should not get, perhaps parabolic-wise, an increase of benefit in terms of carbide density rather than a peak at some arbitrary temperature in between. Similarly, if the data were reliable and accurate enough, he would expect some (at least statistical) indication that, at lower metal pouring temperatures, the results were increasingly better, *i.e.* higher carbide densities as the pouring temperature decreased. Fig. 6, if anything, hinted at the opposite of this. In trying to interpret the graph statistically in terms of heat content effects, he thought it was full of contradictions, and wondered if Bristol, who did this work, had themselves found any logical explanation for these apparently contradictory data.

Mr. Riddihough answered by saying that he quite agreed that that graph was difficult to explain, and that all he had put it in for really was to point out that there was some correlation between carbide density and mould temperature. If one re-plotted the same figures in a number of ways one could not really get any correlation the other way round, *i.e.* between metal pouring temperature and carbide density. In fact, as was stated in the paper, Bristol had tried to find some analogy with stress rupture, elongation and grain-size as well, but nothing had come out of the investigation except the carbide density relationship, and even that could not be correlated with the hot stress rupture and hot elongation.

Mr. R. Taylor then asked whether it had, in fact, been found advantageous to employ a mould temperature of 950 deg. C. with the benefit of an apparent optimum carbide density at that level.

Mr. Riddihough replied that no thermal shock tests had been done in that series of tests, and that his firm had not done anything of that nature on thermal shock tests. They had done thermal shock tests *vis-a-vis* alloys, but not particularly for the different states of one alloy.

Cobalt-base Alloys to rival Nickel-base ?

Mr. A. G. Mason (Deritend Precision Castings, Limited) now asked whether any research work was taking place to produce cobalt-base alloys which would rival nickel-base alloys?

Mr. Riddihough said that work was in progress in the US, both privately, and also by the newly formed Cobalt Development Association. They seemed to be working with a variant of X40, in which the tungsten content had been increased from 5 to 15 per cent., and with an addition of boron to increase the high-temperature strength. Unfortunately, the elongation in such a case went down, and they were trying at the moment to achieve a balance of elongation and stress-rupture life.

MR. H. PLUMMER (Ministry of Supply) ended the discussion by saying that the US approach to the development of high-temperature alloys for gas-turbine applications was somewhat different to that in England. The UK was interested more in the nickel-base alloys, because although there might be little to choose between secondary creep rates of the respective alloys, the primary creep rates of the nickel alloys were not as great as those of the cobalt-base alloys. American turbine-blade tip clearances were larger than those of British engines, and cobalt-base alloys could be used for blades in the States which would not give a satisfactory performance in British engines. It was unwise, he concluded, to compare creep behaviour of cobalt- and nickel-base alloys on the basis of stress-rupture data.

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[1] "Pouring of Investment Castings," M. Riddihough, FOUNDRY TRADE JOURNAL, June 20, 1957, **102**, 761 and 762.

[2] "Influence of Metal Structure on Properties of Investment Castings," Dr. Nicholas J. Grant, *Precision Metal Moulding*, September, 1954, 122 to 126.

Introducing the Author

Mr. M. Riddihough was educated at King Henry VIII School, Coventry, and apprenticed in the metallurgical laboratory of W. H. Allen Sons & Company, Limited, Bedford. He graduated at Sheffield University and joined Deloro Stellite, Limited, in 1933, where he was appointed technical manager in 1942. His interests are the production and industrial use of cobalt alloys, and he is the author of "Hardfacing by Welding" and numerous papers. He is chairman of the Institute of Welding, Birmingham Branch.

European Investment Casters Conference

Since 1955, a number of annual conferences on investment casting have been organized in Europe and most of the members of the European investment casting industry have participated in these. Undoubtedly, every participant feels the desirability of continuing these conferences, dedicated to further the advancement of the investment casting industry, to bring personal contacts and understanding, and exchange of ideas between colleagues.

At the last congress held in Essen (reported in this JOURNAL September 3) a small committee was formed to organize future congresses and to give to the European Investment Casters Conference (EICC) a more definite form. To cover the costs of circulars, preprints, out-of-pocket expenses and the printing of the Essen proceedings, it has been decided to request from each participating firm a contribution of £15 (or its equivalent in other currencies) to be paid to Mr. B. J. Helders, the treasurer, "De Industrie" Vaassen. In future, the conference fee will include the cost of a copy of the "Proceedings." The next congress is to be held in Liège, Belgium, from July 4 to July 6, 1960.

Russian Investment Castir

Russia has shown by a display at the Ag
and Industrial Exhibition in Moscow—phot
here—that the "lost-wax" method of mouldi
shapes is well taken up. The wax pattern of
wheel can be seen at the far-end of the table
wooden box is a cross-section of a mould the

Russian investment castings and mouldi
ment on show at the Agricultural and
Exhibition held recently in Moscow.

would use in making the part, and in the
is a finished casting. Other items displaye
Russians say they make in this way includ
blades (left, foreground) for both jet engin
craft, and stationary power turbines.

National Society of Maste Patternmakers

A visit to the Production Engineering Rese
ciation at Melton Mowbray, Leicestershire,
arranged for members of the National
Master Patternmakers to take place on
November 24. The visit, which will be pr
luncheon at 12 for 12.30 p.m., at the
Melton Mowbray, will commence with a
showing the development of the Associatio
amples of research work in industry: the
followed by a tour of the workshops and
The number of visitors will be strictly limi
and those wishing to participate in either the
the works visits, or both, should make app
early as possible before November 12.

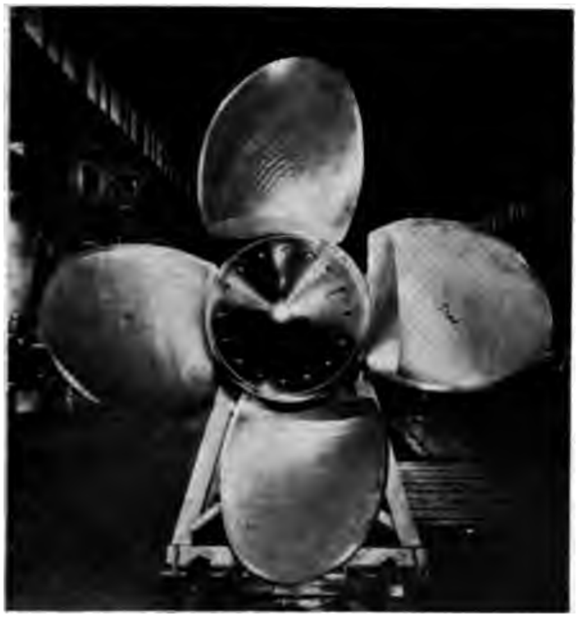
American Letter

US Navy's Largest Controllable-pitch Propeller

A new type of balanced-load controllable-pitch propeller, available in diameters of up to 28 ft. and in three different alloys—Nialite (a nickel/aluminium-bronze specification), manganese-bronze and stainless steel has been developed and patented by Baldwin-Lima-Hamilton Corporation, Eddystone, Pa. It is adaptable to commercial vessels ranging in size from tugboat to super-tanker. The prototype—a reversible, four-blade unit, 9 ft. 9 in. dia., weighing 8½ tons—is the largest controllable-pitch propeller now in service with the US Navy, and its performance has proved superior to that of fixed-pitch propellers.

Navy tests (on the USS Graham County, a 422-ft. landing ship) have proved that variations in propeller pitch allow the engines to develop 100-per cent. mean effective pressure at any engine speed. In addition, the ship was able to stop dead from full speed ahead within a distance of two ship lengths. The new propeller is designed to satisfy the increasing requirements of high-horsepower engines, its control system being completely hydraulic. A four-way control valve and the servo-motor are located in the hub, the valve directing hydraulic oil, supplied by a rotary vane pump, to the appropriate side of the servo-motor which turns the blades for pitch changes. When the desired pitch is reached, the valve shuts off the flow of hydraulic oil. All components of the control circuit, except the master control valves in the engine rooms and pilothouse, are located in the propeller-shaft alley. Each valve in the control circuit is panel mounted for easy accessibility and maintenance. From a design viewpoint, the propeller is best described as a double-crank, single-bearing assembly. "Double-crank" means that on each blade-turning device there are two arms, each applying equal but opposite pressure, to provide a more uniform turning effort than is possible with single-crank or one-arm designs. "Single-bearing" indicates the type of bearing arrangement for holding the blades in the hub, *i.e.*, each of the four blades is threaded into the crankring, which has one journalled diameter.

FIG. 1.—*Controllable-pitch ship's propeller developed by Baldwin-Lima-Hamilton Corporation, Eddystone, Pa.*



Law Cases

Moulder Partially Blinded

A claim for damages by a West Bromwich moulder who was blinded in one eye when struck by a fragment of metal at the factory where he worked, was dismissed by Mr. Justice Pilcher at Birmingham Assizes. The plaintiff was Mr. Gerald Fisher (24) and he alleged negligence by Vowles Bros., Limited, West Bromwich grey-iron and aluminium founders.

He claimed that the firm should have provided him with goggles, or some form of protection for his eyes—and that it permitted him to knock off a projection on a casting when his eyes were unprotected.

Giving judgment, Mr. Justice Pilcher said the accident occurred in April, 1957. On the previous day some castings that Mr. Fisher had made had been rejected. He was concerned because he was working on piece rates. He knocked off a "runner" on the casting with a hammer, to check on the constitution of the metal. A piece flew into his eye.

It was virtually universal practice not to provide men involved in "knocking off" with goggles, the judge said. In addition, the risk of injury to the eye was very remote indeed. "Whether the whole work of the foundry would stop if the defendants tried to instruct the men to wear goggles, I don't know, but goggles are certainly unpopular things with moulders and 'knockers off'," he commented.

Costs were also awarded to the defendant firm.

Factory Fire Compensation

Damages totalling £20,000 were awarded by a settlement at Birmingham Assizes to a Birmingham firm of brassfounders and finishers whose factory was destroyed by fire. Derverlea Products, Limited, claimed damages from Scaffolding (Great Britain), Limited, Bickenhill (Warwickshire), alleging the fire was caused by the negligence of one of its workers. Scaffolding (Great Britain) resisted the action.

Evidence for Derverlea Products was being given when the case was adjourned for a conference by counsel. On their return, Mr. Ralph Brown, QC, for Derverlea Products, announced the terms of the settlement, which Mr. Justice Slade approved.

Mr. Brown, in his opening, said the scaffolding firm was carrying out work at the Clement Street premises of Derverlea Products when one of its employees, carrying a lighted oxy-acetylene torch, went down a ladder. As he did so the flame from the torch set fire to a tarpaulin draped over a window near the fan outlet in the lacquer shop. As a result the factory was destroyed.

By the pleadings, Mr. Brown said, Scaffolding (Great Britain) denied negligence and alleged contributory negligence by Derverlea Products.

Luton Firm Fined

At Luton (Beds) Magistrates' Court, a Luton firm was fined £150 for 11 offences of allowing drivers to work more than 11 hours a day and eight offences of failing to complete vehicle records. The company pleaded guilty; for them it was said that the drivers who worked longer hours were allowed to take full rest periods.

Company News

Mavor & Coulson offers to acquire Austin Hoy

Following the announcement about a month ago that discussions were taking place between two well-known manufacturers of mining machinery and handling equipment, Mavor & Coulson, Limited, Glasgow, and Austin Hoy & Company (Holdings), Limited, Saunderton, near High Wycombe (Bucks), it is now learned that Mavor & Coulson has offered to acquire the £250,000 capital of Austin Hoy on a share exchange of three Mavor & Coulson ordinary shares of 10s. for every four Austin Hoy 5s. shares. It is considered that the merger will lead to greater efficiency in operation, particularly in view of the likely contraction in the coal-mining industry.

The Glasgow firm, which states that no additional capital will require to be created for the transaction, reports that 1959 profits to date are substantially down as forecast, but, subject to unforeseen circumstances, it is intended to maintain the final dividend at 5 per cent. on the capital as increased pursuant to the offer.

Group net assets at December 31, 1958, excluding provision for deferment of tax, amounted to £3,327,515, while those of Austin Hoy at October 31, 1958, totalled £364,269. The Buckinghamshire company's earnings for 1958-59 will also be down and shareholders are told that the yield from the expected final distribution from their Mavor & Coulson shareholding is likely to be more advantageous than would have been forthcoming from the final dividend on Austin Hoy shareholding.

Brig. Sir Harry Mackeson, the chairman, and his fellow directors of Austin Hoy, support the offer terms in respect of their own holding or control of 68,270 shares, and recommend acceptance to shareholders. The offer is subject to acceptance by not less than 90 per cent., or such lesser percentage as may be accepted, by November 13, or not later than December 4. In the event of the offer becoming unconditional it is proposed to pay Sir Harry, and Mr. R. P. Elliott, and Mr. Gourlay (also directors of Austin Hoy) a total of £1,500 between them as compensation for loss of office.

PRESSED STEEL COMPANY, LIMITED—The interim dividend is being raised from 7½ per cent. to 9 per cent. for 1959. A 17½ per cent. final made 25 per cent. for 1958.

MIDLAND ALUMINIUM, LIMITED—An increased dividend of 15 (12½) per cent. with a final of 10 (7½) per cent. is being paid for the year ended June 30, 1959. Group profit advanced to £271,962 (£222,562), and after tax of £99,766 (£93,503), the net profit is higher at £119,337 (£84,058).

OXLEY ENGINEERING COMPANY, LIMITED—A final dividend of 12½ per cent., making 16½ per cent., less tax, is being paid for the year ended June 30, 1959, against a single payment of 10 per cent. in 1958. The company is also paying a further 2½ (nil) per cent., tax free. The group net profit is higher at £84,127 (£77,759).

RANSOME & MARLES BEARING COMPANY, LIMITED—The 17½ per cent. distribution is being effectively maintained with a final dividend of 10 per cent. and a bonus of 2½ per cent. for the year ended June 30, 1959. The previous total included a special interim of 2½ per cent. Group trading surplus is £1,182,056 (£1,423,755), and after tax of £563,771 (£756,400), the net profit is £609,396 (£666,581).

JOHN DALE, LIMITED, makers of non-ferrous collapsible tubes, aluminium and light-alloy castings, etc., of London, N.11—Since the announcement of agreement of terms for the proposed merger with Metal Closures, Limited, Winterbottom Industries, Limited, which also made an offer for the shares and loan stock of John Dale, has stated that the offer has lapsed as its condition has not been fulfilled. Acceptances so far received will be returned.

NORTH EAST COAST SHIPREPAIRERS, LIMITED—Payable December 15, an interim dividend of 3½ per cent. is announced by the company for the year ending March 31, 1960 on the £1,500,000 ordinary capital. A total of 11 per cent. was forecast last April. For the previous nine months a dividend of 10 per cent. was paid on a £750,000 capital prior to a one-for-five scrip issue and a £600,000 issue against the acquisition of Brigham & Cowan, Limited, engineers and dry dock owners, etc., of South Shields (Co. Durham).

Head Wrightson Plant for Colvilles

An order for the supply and construction of a blast-furnace gas-cleaning plant for the Ravenscraig Works, has been placed by the Scottish steelmakers, Colvilles, Limited, with Head Wrightson Iron & Steel Works Engineering, Limited, a subsidiary of Head Wrightson & Company, Limited, Thornaby-on-Tees (Yorks). The plant will mostly be manufactured by Head Wrightson at its Tees-side works.

The order is for an extension to a similiar plant constructed by the company two years ago at Ravenscraig and it forms part of the extensive strip mill project which Colvilles has undertaken. The complete plant will be capable of cleaning 15,000,000 cub. ft. per hour of blast-furnace gas and new equipment now to be supplied will comprise one gas-washing tower and two Head Wrightson Research Cottrell wet-tube electrostatic precipitators together with the necessary gas mains, valves, pumps, water mains, etc. Ancillary equipment will also be supplied for the handling and recovery of sludge from the circulating water system.

It is expected that the plant will be in commission by the middle of 1961. On completion it will be the 12th of this type to be supplied by Head Wrightson to the iron and steel industry during the last eight years. The value of the contract is about £357,000.

Alcan to increase Aluminium Production

Increase in production of 35,000 tons by its chief operating subsidiary, Aluminium Company of Canada, Limited, is announced by Aluminium, Limited. The present production is 530 000 tons a year. The increased production will be shared between three of the company's plants, Arvida, Quebec (17,000 tons), Shawinigan Falls, Quebec (10,000 tons), and Kitimat, British Columbia (8,000 tons). Expressed as a percentage the increase is 6.6 per cent.

The company says that the increased output at Shawinigan Falls and Kitimat will be effected fairly soon, while that at Arvida will take a "little while."

Nuclear Power Collaboration

Agreement between Humphreys & Glasgow, Limited, London, and Alco Products Incorporated, New York, in connection with nuclear power-station units of up to 30 mw capacity has been terminated by mutual consent.

Humphreys & Glasgow announces that it is prepared to offer a similar range of comprehensive power stations incorporating pressurized water reactors designed and manufactured by Babcock & Wilcox, Limited.

ın Mechanical Handling Federation

congress of the Fédération Européenne :ntion (European Mechanical Handling ›ok place in Lucerne, Switzerland, from to 25. More than 250 industrialists from um, Denmark, Germany, Great Britain, ıce, Holland, Italy, the Saar, Spain, ;witzerland as well as from the affiliated ıe International Ropeway Association, ı the congress. Certain representatives ıical-handling industry of the USA were s observers.

rted at the congress that in addition to ·ied out by the individual sections, the ·ities have also been undertaken.

Customs Tariffs

ee under the chairmanship of Mr. ınce) has studied a draft for the estab- a joint foreign customs tariff of the ›nomic Community and has drawn up :h, through the intermediary of COLIME nittee of the European Mechanical and ustries), have been transmitted to the ›mmittees in Brussels. The FEM has :d a close liaison with the International ganisation (ISO) with a view to col- he work undertaken or to be undertaken ıd relating to mechanical-handling equip- omponent parts.

had been sent to the different national d from information received it had been to establish an index of the turnover g to mechanical-handling appliances in the countries affiliated to the FEM. follow: 1954, 100; 1955, 117; 1956, 138; l 1958, 177.

:il of Management and the general ıe FEM, under the chairmanship of Mr. len), president of the Federation, passed ıuired for the administrative and financial ·f the Federation and examined problems :rest to the mechanical-handling industry. stated that a committee had been set up ›repare comments on "The General Con- ıe Supply and Erection of Plant and ›ublished in Geneva in March, 1957, by Economic Commission of the United nization. These comments would show ıditions should be interpreted in regard s types of equipment supplied by the ıe FEM.

›n with the decision of the members of the FEM (earth-moving equipment) to now on with the European Construction deration, this was approved, but in view hat certain items of the equipment in e being for Public Works, were neverthe- in mechanical handling, it was stressed aison between the two organizations was

: committee of the FEM for the year 1960 ›osed as follows:—President, Mr. P. B. ritain): vice-presidents Mr. E. Turrinelli ·. Frey (Switzerland): honorary presidents, :rville (France) and Mr. G. Salzer The permanent secretary is Mr. J. de ance). The eighth annual meeting ıtion has been arranged for the end of ıd will take place in Stockholm, Sweden.

Dinner

JOINT IRON COUNCIL

A total of nearly 700 ironfounders, ironmakers, and guests attended the Annual Banquet of the Joint Iron Council held on Tuesday, of this week, at the Dorchester Hotel, London. The guest of honour was the Rt. Hon. Reginald Maudling, M.P., president of the Board of Trade (and who until recently was a Cabinet Minister closely associated with the Ministry of Power *i.e.* that principally concerned with the affairs of the iron industry). It was Mr. Maudling who proposed: "The Iron Industry," the first of the two toasts following that to the Queen. The response to this toast was ably made by Mr. N. P. Newman, J.P., president Joint Iron Council (and chairman and managing director of Newman, Hender & Company, Limited), who took the chair at the banquet. The second toast—to "The Guests"—was proposed by Mr. N. C. Macdiarmid, chairman of the Council of Iron Producers and a member of the executive of the JIC (also, managing director of Stanton Ironworks Company, Limited). In this case the response was made by Sir Cyril Musgrave, K.C.B., who succeeded to the chairmanship of the Iron and Steel Board in February this year, on the resignation of Sir Archibald Forbes, G.B.E.

During the evening a presentation was made to Mr. Brian Cook, aged 20, an apprentice employed by Bayliss, Jones & Bayliss, Wolverhampton. This took the form of a cash prize for being the best apprentice at the National Foundry Craft Training Centre during the period under review. This prize, the gift of the Worshipful Company of Founders, was awarded for the first time this year; it was handed to Mr. Cook by Mr. Maudling.

As usual there was a large top table at the function, including—along with those attending the banquet —a wide representation of leading industrialists, Members of Parliament from both sides of the House; men prominent in the foundry industry and in various industrial organizations. The formal proceedings concluded at about 10.30 p.m., when members and guests were left free to circulate at will amongst the gathering, renewing old acquaintances and making new friends.

Correspondence

NATIONAL WORKS VISITS

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—Through your columns, may I express my surprise that despite the very encouraging caption "Welcome on the Mat" (JOURNAL, October 22), I have found to my cost that one of the companies only welcomes members of its employers' association, not members of the Institute of British Foundrymen who have organized this very popular event.

I made application to join the function during the first week after it was announced and was accepted for one of the visits. Then, seven days before the event, I was told my name was not acceptable to this firm because my company were not members of the particular employers' association.

How many other members have been affected by this "ban" which embarrassed both the IBF and its members?

Yours etc.,
GEORGE I. DUFFIN.

Sutton-in-Ashfield.

Personal

Mr. S. C. Anthony, F.I.M., has been appointed general manager of Aluminium Ingot Makers, Limited, Yeadon, Yorkshire.

Mr. James A. Andrew has been appointed to the board of McKechnie Brothers, Limited, as administration director.

As from November 9, the address of Mr. T. B. Burrows will be "Lauderville," 48, Cambridge Road, Linthorpe, Middlesbrough.

Air Control Installations, Limited, Ruislip, Middlesex, announce that Mr. D. G. Hill has been appointed manager of the air-filter department.

Mr. James E. Robinson, M.I.MECH.E., chief engineer of Hepworth & Grandage, Limited, has been appointed to the board of directors of the company.

Wickman, Limited, announce the appointment of Mr. R. J. Dixon as director and general manager of their machine-tool manufacturing company.

Mr. J. A. Hartley has been appointed a deputy managing director of Steele & Cowlishaw, Limited, of Hanley, a member of the Baker Perkins group.

Mr. J. K. Vaughan-Morgan, M.P., who recently resigned as Minister of State, Board of Trade, has rejoined the board of the Morgan Crucible Company, Limited.

Mr. S. Hallam, formerly depot manager at Netherton, Huddersfield, has been appointed manager of the David Brown Equipment Company, Limited, Meltham, near Huddersfield.

Mr. J. S. Hastie, technical manager, has been appointed works director of the Renfrew factories of Scottish Cables, Limited. The new technical manager is Mr. J. T. Henderson.

The British Cast Iron Research Association announce the following appointments to the staff: Mr. P. Dewell, B.Sc., to the foundry atmospheres section and Mr. W. R. Roberts, B.Sc., to the sand section.

Dr. M. G. Say, Professor of Electrical Engineering at the Heriot-Watt College, Edinburgh, will give the annual Faraday Lecture in Sheffield on December 1. His subject will be electrical machines.

Sir Lincoln Evans, vice-chairman of the Iron and Steel Board, will be the guest speaker at the annual prize distribution of the education department of Samuel Fox & Company, Limited, at Stocksbridge on November 25.

Mr. L. Schepers, a managing director of the Royal Dutch/Shell group of companies, has been appointed chairman of Shell Chemical Company, Limited, in succession to Mr. F. A. C. Guepin, who retired in June this year.

Mr. A. M. Mackay has been appointed service manager, and Mr. B. P. Guard London representative of the Bergius Company, Limited, diesel-engine manufacturers, Glasgow, a wholly-owned subsidiary of Associated British Engineering, Limited.

Mr. Bernard Upton, a departmental manager at Edward Pryor & Son, Limited, makers of marking devices, Broom Street, Sheffield, was presented with a stereophonic radiogram on October 26 to mark his 50 years' service with the firm.

To commemorate the completion of 60 years with Charles Roberts and Company, Limited, Railway Wagon Works, Horbury Junction, near Wakefield, the workpeople and staff have presented Mr. Duncan Bailey, the firm's chairman, with an inscribe pencil set.

Mr. William L. Mather, who is to take chairmanship of Mather & Platt, Limited, textile, hydraulic, and fire protection enginee Manchester, on April 1, 1960, started a 3 business tour on October 30. He will visit countries.

Mr. John Michael Eddison, an Aber engineer, who left Britain two months ago an appointment in Persia with Brian Col Partners, has been awarded, by the Inst Civil Engineers, 125 gns. from the Charles Prize competition fund for his design of viaduct.

The President of the Federation of Com and British Empire Chambers of Commer Hon. the Lord Lloyd, M.B.E., and the High sioner for the Union of South Africa, His the Hon. Dr. A. J. R. van Rhijn, will be the speakers at the fourth annual dinner of th of General Managers to be held at the Sav London, on November 27.

Mr. Walter Anderson Galbraith, appointed general sales manager of the Yale Manufacturing Company's British Materials Division at Wednesfield, Staffs. Mr. Harry has been promoted from assistant sales manag Kingdom), to sales manager (United King Mr. Michael John Stuart, from assistant sal ger (export) to sales manager (export).

Mr. John Rannie, shipyard director of Jo & Company (Clydebank), Limited, has appointed president of the Clyde Shipbuild ciation. Also reappointed were Mr. W. B. J a director of Alex. Stephen & Sons, Limited, and Mr. G. Morrison, managing directo Greenock Dockyard Company, Limited, presidents. Mr. J. B. Cunninghame, sec Barclay Curle & Company, Limited, Glas appointed treasurer.

David Brown Industries, Limited, have David Thompson, a student apprentice, wit recognition of his outstanding achievement at University. He went to the University's m engineering department on an award from the later gained a technical State scholarship. In year, he has obtained the B.ENG. degree with honours; headed the honours list in mecha gineering; shared the Mappin award for the ing performance in the faculty; won the Jo prize of £50 for the student in mechanical en who, in addition to technical performance, h buted most to the University's corporate life.

Following completion of the third develop of the Steel Company of Wales, Limited, and the retirement of Captain H. Leighton Davies, 1960, the following appointments have been the board of the company. Mr. R. W. Evans a director and deputy general manager of division. Mr. R. H. M. Kindersley is mad executive member of the board. Mr. L. Maxwell is appointed a director and general designate to the tinplate division to succeed Leighton Davies next June. Mr. Shirley Ga become deputy general manager of that divis the same date. Captain Leighton Davies will as a consultant to the company after his retire

News in Brief

LUMINIUM COMPANY OF CANADA have an- hat, to meet increasing world demand for ı products, it will increase production at British Columbia.

'ROUGHT-IRON gas lamp-posts, displaced by Corporation's street-lighting electrification ıave been exported to Norway for use as ı at the entrance of an Oslo house.

ts of Wolverhampton Junior Chamber of : visited the Bilston iron and steel works :s and Lloyds, Limited, on October 28. They ı showing the manufacture of iron and steel vards toured the plant.

ıENTATION AND AUTOMATIC CONTROL for the ɔmmissioned 100-ton oil-fired open-hearth : the Glamorgan Works of the Briton Ferry ıpany, Limited, has been supplied by George ıited, Luton, Bedfordshire.

VEN TANNETT, managing director of Stanley .B.), Limited, Sheffield, who recently returned :wo-weeks business tour of Germany and d, said he considered that British industry ete. quality for quality, with Germany any- ɟ also sell in the German market.

ı0,000 SHIPBUILDING ORDER, has been secured ıirfield Shipbuilding & Engineering Company, Glasgow. It is for the construction of nine ferries for Denizcilik Bankasi T.A.O. of Each of the vessels will be capable of carry- passengers operating on the Sea of Marmara Bosphorus.

ROE, CANADA, LIMITED, a member of the Siddeley Group, Limited, is negotiating with JS firms for contracts to handle assembly s, an official of the company stated on Octo- t is also reported that Avro Aircraft, Limited, Roe, Canada, subsidiary, may be planning to th the Kaiser Corporation, of the US.

ıTITY of iron ore found in the Thirthamalai : Salem district, Madras (India), has been at 47,500,000 tons. The ore is chiefly found tite-Quartzite rock with an average iron-con- 5 to 40 per cent. Three private parties have pproached the Government for permission for y to produce from these ores 15,000 tons of per annum.

RANGE of Chieftain models will be introduced n Motors, Limited, at the Scottish Motor ıvember 13 to 21. Also exhibited at the Show ·st time is the Albion Revier with twin driving he rear. The new Chieftain series II is based n chassis with new Albion 5.5 litre 4-cylinder ;ine. fitted with 6-speed gearbox and standard :ab and the Reiver has a 10-ton 6-wheeled

, LIMITED, Erdington, Birmingham 24, an- ıe establishment of a South Wales area sales Cardiff. The area representative for South Mr. W. H. Statham, who has his headquarters iated Electrical Industries, Limited, Mervyn Frederick Street, Cardiff. Mr. Statham who r'e: in 1946, was, prior to this new appoint- sales engineer in the furnace division of the .

ıMAN BROTHERS, LIMITED, excavator manu- Hull, have received a further order, valued 00. for excavators and replacements from the Polish Government. Shipments will commence from Hull during this month. The order is for 37 machines for use chiefly on land drainage. Priestmans had a similar order in May and this brings the total number of excavators supplied by the company to Poland, since the war, to over 120.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED, has cut the working week for the greater part of its work force from 44 to 42 hours. This was announced last week after a meeting between representatives of ICI and of no fewer than 23 trade unions involved. It is hoped the new hours will come into effect after January 4. There will be no corresponding loss of pay and it is estimated that the shorter hours will cost the company about £2,000,000 a year.

Mr. B. J. DUNCAN, field sales manager of W. C. Holmes and Company, Limited, Huddersfield, spoke to 75 leading Sheffield industrialists on the selection of dust collection and control plants at Sheffield Royal Victoria Hotel on October 27. He stressed the importance of the equipment because of the increasing demands of the Clean Air Act. A plant was recently installed at the Rotherham steelworks of Steel, Peech and Tozer Limited, at a cost of £25,000.

LOGAN MINING MACHINERY COMPANY, LIMITED, Lochee, Dundee, has changed its name to Logan Engineering, Limited. In a statement, the company said that for some time it had been felt the name did not reflect the scope of their activities, and that the new name would describe more accurately the general nature of the company's engineering facilities, which include precision engineering. No alteration was contemplated either in the control or management of the company.

ON OCTOBER 1, Shalco Corporation of Palo Alto, California, became a wholly-owned subsidiary of the National Acme Company, of Cleveland, Ohio. This latter company is now entering its 66th year as a producer of "automatic" lathes and a wide variety of machine-tools. Shalco shell-coremaking and moulding equipment will continue to be made under licence in the UK by Coleman-Wallwork, Limited. Mr. A. Woods remains as Shalco's European representative.

TANGYES, LIMITED, have been awarded the contract for the supply of hydraulic equipment to Canada Iron Foundries, Limited, who are to manufacture the tunnelling shields to excavate the Bloor University Avenue Subway in Toronto. The equipment consists of cylinders and rams, erector arms, and hydraulic pumps. The order, which is for $600,000 (approx. £200,000) worth of equipment, has been secured against keen international competition on both price and delivery by Tangyes of Canada, Limited, Montreal.

SHEFFIELD HEALTH COMMITTEE decided on October 26 to serve statutory notices on 56 people who have done nothing about the clean-air requirements in the city's No. 1 smokeless zone. Otherwise progress is reported to be very encouraging and assurances have been received from suppliers of the necessary appliances that they will be able to deal with the work required to make the zone virtually 100 per cent. smokeless by December 1. In the zone of 438 acres, there are 1,160 houses, 554 industrial concerns and 1,292 commercial premises.

HENRY WIGGIN & COMPANY, LIMITED, have been invited by the Mechanical and Production Engineering Department of Hatfield Technical College, Herts, to stage an exhibition as part of a "Nickel Survey" course which is being held at the College. The exhibition will be open from November 17 to 19, and in addition to demonstrations of the properties of Wiggin alloys, there will be on show complete aircraft gas

News in Brief

turbines, one of the early Whittle engines, and over 300 examples of the type of plant component and sub-assembly for which the company's materials are used.

THE BOARD OF TRADE has issued particulars of a "call for tender" by the Water Supply Administration, Municipality of Addis Ababa, P.O. Box 1505, Mesfine Haarrar Street, Addis Ababa, for 115 items of pipe fittings. These include gate-valves, valves, suction strainers, tees, elbows, bends, nipples, plugs, unions, sockets, back-nuts, and galvanized bushes. A copy of the tender announcement, or a photostat copy, price 4s., may be obtained from the Export Services Branch of the BOT, Lacon House, Theobalds Road, London, W.C.1. The BOT reference number is ESB/25426/59. The closing date for receiving tenders is November 10.

AT THE FIRST of two foundry industry meetings to be held by the Manchester and District Productivity Association on November 10, in the Lesser Free Trade Hall, Manchester, a paper entitled "A Modern Steel Foundry for the Manufacture of Small Steel Castings by New Moulding Techniques" by Mr. John H. Osborn, M.P., M.A., Mr. T. A. Marsden and Mr. R. F. Horton, joint authors, was presented and supported by a film entitled "SOCAST Steel Castings." The paper and film dealt with the production of steel castings by the shell-mould, Osborn/Shaw and CO_2-block processes in the new foundry of Samuel Osborn & Company, Limited, Sheffield.

Dr. H. J. MANGOLD, Commercial Counsellor of the Embassy of the Federal Republic of Germany, accompanied by Dr. Stappert, head of the commercial department of the Embassy, and a number of German journalists were guests of the Brockhouse Organization at the group's head offices and works at Hill Top, West Bromwich, Staffs on October 15. After luncheon with the directors, the visitors toured the various divisions of J. Brockhouse & Company, Limited, the parent company of the group, and were later shown over the vehicle-spring making factory of Richard Berry & Son, one of the organization's subsidiary companies.

"PURCHASING AS AN AID TO PRODUCTIVITY" is the theme of a conference, organized by the Willesden & Hendon Productivity Committee, which will be held at the headquarters of the Federation of British Industries at 21 Tothill Street, London, S.W.1, on January 27, 1960. Both large and small organizations are expected to find the conference of special interest to management as well as people concerned with purchasing. The chairman will be Mr. M. Seaman, director and general manager of British Oxygen Engineering Company; the admission fee is two guineas, and further particulars may be obtained from Mr. D. I. Duncan, A.E.I. Switchgear Division, 20 Neasden Lane, Willesden, N.W.10.

Mr. P. J. C. BOVILL, the Master Cutler, forecast a period of industrial expansion similar to that in the early 1950's, when he spoke at the 40th anniversary dinner of the Sheffield and District Works Sports Association on October 23. He said, "In the United Kingdom recently, productivity has gone up higher than it has ever done before. But the rate of increase is still slower than it should be." He added that "modern plant, new techniques and the co-operation of everybody who works in industry, from shop floor to
the directors, were combined in the great gr
wanted to see. Industrial peace was neede
bickerings or wildcat strikes, no tyrannies, a
body having a share in the prosperity." M
Hammond, Association president, said the A
was the biggest and healthiest in the country.

BRIERLEY HILL COUNCIL at its meeting on O
stated that an alkali inspector of the Mi
Housing recently met its Public Health Com
discuss complaints which the Council had recei
the increase in the smoke and fumes from th
Oak Steel Works, and told committee mem
"the problem of pollution caused by irc
discharged from electric-arc furnaces in stee
not peculiar to Brierley Hill, but occurs
modern steelworks operate in this country
Minister's inspector said that the new type o
now in use "presented fumes problems o
difficult nature." Brieley Hill Council were
that under the Clean Air Act of 1956, steel-
works were excluded from the control of loca
ties and became the responsibility of alkali i
of the Ministry of Housing.

PROFESSOR M. STACEY of Birmingham U
guest speaker at the annual dinner recently
Walsall branch of the National Union of Manu
stressed that the economic survival of Brita
depend on the scientific and technological tr
its young people coupled with their proper
in industry. Speaking of his visits to the US
Russia, Professor Stacey said "I came back fi
a sense of apprehension and foreboding.
scarcity of resources I wonder whether in
years we shall be able to compete." The
do so, he suggested, would depend on inven
discovery together with a more realistic us
nation's resources. Britain was fortunate, he
being in the forefront of the world in d
uranium, but in many instances, discoveries
made in Britain only to be developed later in
by young British scientists who had gone out

Obituary

The death is reported of Mr. B. R. MILL
partner of Thomas Millar & Company (E
Limited, Glasgow.

Mr. STANLEY HIRST, who has died at the
was chairman of Henry Brook & Company
ironfounders and structural engineers, Hudder

Mr. FRANK DUDLEY HENSON, who since
been proprietor of T. Gibson & Sons, engi
ironfounders, of Stamford (Lincs), died on C
at the age of 60.

Mr. THOMAS PEATTIE COCHRANE, who died
day, October 22, was a director of C
(Bo'ness), Limited, engineers, shiprepairers, a
makers, etc., of Bo'ness (West Lothian).

Railway-poster Advertising: Quite a larg
of foundry concerns use railway posters as
of attracting custom. The latest to join th
Le Grand Western Foundries, Limited. T
illustrates a large casting and a handful of
ings and the public is informed that they are
than 10 miles from Paddington Station.

w Material Markets

Iron and Steel

n of pig-iron continues to expand, par-
he low-phosphorus foundry and basic steel
s. Demands for hematite and high-
ig-iron are also increasing, but to a much
than the other descriptions. Production
castings has been stepped up and the
nected with the motor vehicle trade are
preciable outputs, with present demands
increase on previous delivery schedules.
ine-tool and steel industries are also
creased quantities of castings and these,
the overall demands from many other
the engineering and speciality foundries
the main, satisfactory outputs. From
collieries, however, only moderate calls
are forthcoming. Low-phosphorus pig-
eavy request by these foundries, and
ral sources of supply are now available,
brands preferred by them are more
cure, particularly for new customers, due
d demands and the present heavy commit-
furnaces. Overall, however, sufficient
ar to be available to satisfy the needs of
apart from variations in analyses, chiefly
phorus content. Increased supplies of
refined irons are being accepted by these
iveries of which are adequate.

ncreased outputs of steel, which are now
of 90 per cent. of productive capacity,
ds are made for basic pig-iron, although
ing used as freely as it would have been
of scrap was less plentiful. Producing
able to meet current demands without
ematite producers are also benefiting by
all from the steel trade for ingot moulds

e light foundries maintain their improved
ly on account of the bigger demands for
ipment. Fairly good demands are being
lders' castings, but the use of alternative
this industry continues to reflect against
. While the call from these foundries for
rus pig-iron continues to improve, the
have tonnages to spare from current
t from the appreciable stocks held by

r the products of the re-rollers is sustained,
are obtaining outputs on a vastly improved
demands are made for small bars and
and there continues to be a heavy call
g rods. Expanding demands are being
l semis, and some of the steelworks are
r their outputs for two or three months
ough efforts are continually being made
rs to book additional supplies for prompt
ulty is being experienced in obtaining these
s expressed as to the ability of home
satisfy present requirements fully.

Non-ferrous Metals

e is still no sign of a settlement of the
in the United States, that at Braden's El
e in Chile was virtually settled last week-
sumption of work there should ease the
ent supply position somewhat, but, on the
the White Pine Copper Company in the
he few copper mines still in production,
bound towards the end of last week.
, prices, taking into account their considerable rise, are holding up reasonably well. But the market is very sensitive and the immediate outlook depends entirely on the US strike position. In the US custom smelters are still unquoted as to price, but reports indicate that metal for early delivery is fetching around 40 cents a pound, equivalent to £240 a ton. Producers are still showing a price of 31½ cents a pound, but this is a more or less nominal quotation.

Tin is quiet in the East, in the United States, and patchy in London. The most interesting report on this market has been the opinion that the amount of tin left in the buffer may now be as little as 6,500 tons. If this is so it may well be that the International Tin Council has directed the buffer stock manager to dispose of his entire stock so that the money which finances it can be repaid to the mining companies which put it up in the first place. In London the cash price is fluctuating narrowly around £794 a ton, while in the United States it is on offer below $1.02 a pound.

Lead is a reasonably stable market, with the price fractionally above £71 a ton in London and unchanged in New York at 13 cents a pound.

Zinc prices continue to rise, although the shortage of nearby metal appears to have eased. Demand is satisfactory, the outlook is still good, with the price in London not far short of £100 a ton, while it is now 12½ cents a pound, East St. Louis basis, against 12½-13 cents previously.

Cut in Babcock & Wilcox Interim

Design and manufacture of nuclear and large boiler plant have necessitated a considerably greater amount of development work than was anticipated by Babcock & Wilcox, Limited, London, N.W.1, and the new processes involved have adversely affected and delayed production. Because of this the company has failed to maintain its rate of profit in 1959 to date, as forecast, and the interim dividend is reduced from 6 to 4½ per cent. A total of 13 per cent. was paid in 1958.

In spite of severe competition, state the directors, orders received in recent months have been encouraging in volume, although at reduced profit margins.

Mond Nickel Fellowships

The Mond Nickel Fellowships Committee have now announced the award of a Fellowship for 1959 to the following applicants:—Mr. D. J. O. Mann (John Lysaght's Scunthorpe Works, Limited), to study the practical applications of recent metallurgical research and techniques to the production of basic semi-finished steel; and Mr. N. J. B. Pocock (Capper Pass & Son, Limited), to study developments in extractive metallurgy in the United Kingdom, Europe, the USA, and Canada, and their dependence on the size and location of the organizations concerned.

Photographic Paper

The material formerly known as Kodak colour print paper type C has now been re-named "Ektacolor" paper. Its properties remain unchanged.

Lord Mills, the Paymaster General, will not now be able to be the principal speaker at the annual dinner of Sheffield Chamber of Commerce on November 10, as he has been commissioned to lead a Government mission to Australia. It was announced on October 27 that the place of Lord Mills at Sheffield will be taken by Mr. Frederick Errol, the Minister of State, Board of Trade, who will speak, it is expected, on the Government's views on industry and commerce.

Current Prices of Iron, Steel, and Non-ferrous Me

(Delivered unless otherwise stated)

November 4, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P. 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent, C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. £44 12s. 0d.; floor plates (N.-E. Coast), £43 1 angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, und and flats 5 in. wide and under, untested soft basic, and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 under 4 tons to 2 tons, £41 3s. 0d.; hoop and stri 100 tons and over, £38 0s. 0d.; uncoated strip mill rolled, under 3 mm. to 12g., 25 tons to under £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons a £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 over, £67 11s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 nickel-chrome, £99 4s. 0d.; nickel-chrome-moly £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £254 10s. 0d. to £255 0s. 0d months, £244 0s. 0d. to £244 10s. 0d.; se £255 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 5¼d. rods, 275s. 0d. per cwt. basis; 20 s.w.g., 310s. 0d.

Tin.—Cash, £793 10s. 0d. to £794 0s. 0d.; three £795 10s. 0d. to £796 0s. 0d.; settlement, £794 0s.

Lead (Refined Pig).—First half November, £7 to £74 5s. 0d.; first half February, £73 15 £73 17s. 6d.

Zinc.—First half November, £94 15s. 0d. to £ first half February, £91 0s. 0d. to £91 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, a destinations, £130 15s. 0d.; rolled zinc (boiler English destinations, £128 10s. 0d.; zinc oxide (d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0½ sheets to 10 w.g., 223s. 3d. per cwt.; wire, 2s. 10 metal, 223s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £166; B6, £217.

Brass (High Tensile).—BS1400, HTB1, £19 £215; HTB3, £228.

Gunmetal.—BS1400, LG2, £207; LG3, £217; £272; G1, 1%, £259.

Phosphor Bronze.—BS1400, PB1 (AID releas BS1400, 90/10/1, £287.

Leaded Phosphor Bronze.—BS1400, LPB1, £22

Phosphor Bronze Strip, etc.—Strip, 314s. 0d. wire, 4s. 3¾d. per lb.; rods, 3s. 6¾d.; tubes, 3s. cast bars; solids 3s. 6¼d.; cored 3s. 7¼d. (Charles Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in 0.056, 3s. 11¾d. per lb.; round wire, 10g. in coi cent.), 4s. 4¾d.; special quality turning rod, 10 ½ in. dia., in straight lengths, 4s. 3¾d. All prices

Other Metals.—Magnesium, ingots, 2s. 3d. Antimony, English, 99 per cent., £190 0s. 0d. Q ex-warehouse, £72 0s. 0d. Nickel, £600 0s. 0d. A ingots, £180 0s. 0d.; aluminium bronze (BS1400), A AB2, £261.

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* Average 68–70 per cent.

CSC High Authority reorganizes Administration

A special session devoted to the reorganization f its working-groups and its administration was held y the new High Authority of the European Coal and teel Community on Thursday and Friday, October 22 nd 23.

The scope and balance of the High Authority's ctivities have been somewhat changed by the fact that e problem of the co-ordination of energy policy ithin the Community has become of primary importnce and that this will henceforward determine its olicy on coal. The patterns of importance attached the different work carried out by the Authority and various services also have altered during the period transition.

By re-grouping, greater concentration, and co-ordinaon it is hoped to arrive at a simpler administrative ystem. Most of the division will be grouped into a imited number of departments under directors-general.

There will now be seven groups within the Authority ach with its own president as follows:—Rules of ompetition (including Rules of Transport), vice-presient, Mr. Oppe; External Relations and Information, Mr. Wehrer; Social Problems, Mr. Finet; Finance and nvestment Mr. Potthoff; Economic Policy and Industrial Reconversion, Mr. Reynaud; Co-ordination of Energy Policy, Mr. Lapie; Coal and Steel Market, Mr. Hellwig.

By limiting the number and composition of the working-groups, the president, Mr. Malvestiti will be able to call upon his vice-president, Mr. Spierenburg (who has not been made president of any of the working-groups), for greater help in his (the president's) many tasks.

Board Changes

DAVID ROWAN & COMPANY, LIMITED—Mr. Horace Willson has retired from his position as chairman. His successor is Mr. W. Simon Wilson.

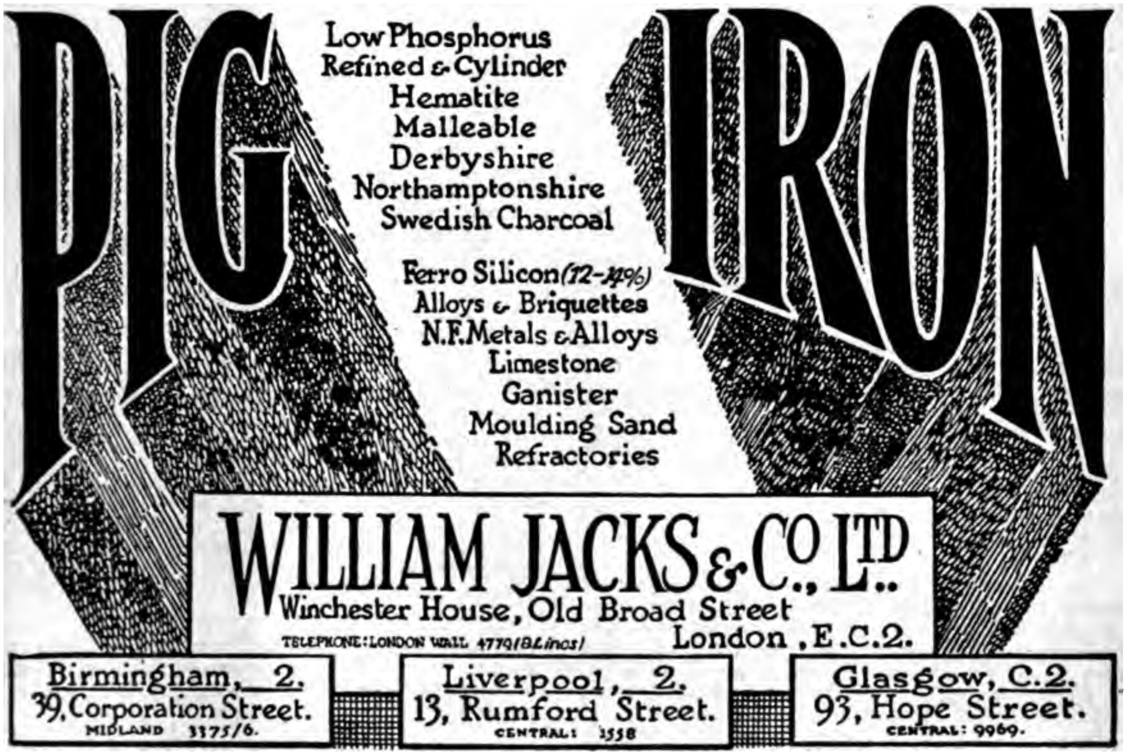
WILLIAM HAMILTON & COMPANY, LIMITED—Mr. Horace Willson has been elected president of the company and ceases to occupy the positions of chairman and managing director. Sir William Lithgow has been elected chairman.

CARDINAL STEELS, LIMITED—Mr. Robert G. Young has been appointed a director and general manager. Mr. Geoffrey Edwards has resigned as managing director of the company and its subsidiary, Gillotts Forge & Rolling Mills, Limited, but remains on the boards of both companies.

DOWTY GROUP, LIMITED—Mr. J. C. G. Wegerif, assistant managing director of the Bentley Engineering Group, Limited, has been appointed an additional director. The board of Bentley Engineering has agreed to allow Mr. Wegerif to give some of his time to the Dowty Group's broader production policy, made necessary by new developments now reaching a production stage.

Recent Wills

DAKIN, G. E., of Hunslet, Leeds, iron and steel merchant, governing director of T. Burns, Dakin, Limited	£58,135
MACHARG, SIR ANDREW, former deputy chairman of the Clydesdale & North of Scotland Bank, Limited, chairman of A. & J. Main & Company, Limited, and a director of a number of companies including the North British Locomotive Company, Limited, Bairds & Dalmellington, Limited, and the Gourock Rope Company, Limited ...	£167,380



PIG IRON

Low Phosphorus
Refined & Cylinder
Hematite
Malleable
Derbyshire
Northamptonshire
Swedish Charcoal

Ferro Silicon (12-14%)
Alloys & Briquettes
N.F. Metals & Alloys
Limestone
Ganister
Moulding Sand
Refractories

WILLIAM JACKS & Co., LTD.
Winchester House, Old Broad Street
London, E.C.2.
TELEPHONE: LONDON WALL 4779 (8 Lines)

Birmingham, 2.
39, Corporation Street.
MIDLAND 3375/6.

Liverpool, 2.
13, Rumford Street.
CENTRAL: 3558

Glasgow, C.2.
93, Hope Street.
CENTRAL: 9969.

Publications Received

Publicity and Promotion. Issued by the Vitreous Enamel Development Council, Limited, 28, Welbeck Street, London, W.1.

This 12-page brochure tells of the progress made by the Vitreous Enamel Development Council since its inception some three years ago. Besides arranging lectures and film shows, the Council has taken space at exhibitions and advertised in the Press and through the medium of television. Future plans include a change for the better in its slogan from "Glass on Steel—the Lifetime Finish"—which is not sufficiently comprehensive—to "Genuine Vitreous Enamel—the Lifetime Finish." The contents of the booklet include the use of vitreous enamel in hardware, architecture, and on aluminium. It is a very lively publication, worthy of study by other employers' associations.

Quick Guide to the Nickel-containing Casting Alloys. Issued by the International Nickel Company, Inc., 67, Wall Street, New York, N.Y., U.S.A.

Multum in parvo has always been the predominant feature of this 28-page booklet. In this issue, through the incorporation of six fold-out pages, space has been made available to outline, in table form, the application in 12 industries of three varieties of steel, two ductile irons, three sorts of cast iron, four different bronzes and four "others." The last column of the table refers the reader to a page number, where more information is given as to usage and mechanical properties of the alloys entering the main groups.

British Standards Institution, Annual Report. 1958-9. Published by the Institution from 2, Park Street, London, W.1; price 7s. 6d.

This Report should not be confused with the Year Book of the British Standards Institution, which is regarded as a valuable work of reference to those seeking information on standards. The Annual Report includes a general statement of the activities of the Institution, a number of divisional reports, notes on international activities, and finally, a list of the personnel of the various Councils, committees and officers. The number of licences issued permitting the use of the Kite mark is now 1,404, an increase of five over the previous year.

The Iron Dale, by Victor Lewis, and illustrated by Alan Carr Linford. Published by the Stanton Ironworks Company, Limited, near Nottingham.

Anyone who receives this 48-page book can indeed count themselves fortunate, for it is magnificently produced, beautifully illustrated, and clearly written. It covers the history of Stanton Dale, which, in mediæval days, was graced by an imposing abbey. The story tells of the beginning of the now great Stanton enterprise, its growth and its conduct towards its workpeople. It is indeed a proud record, and one which makes fascinating reading. The reviewer congratulates those responsible for having done such an excellent piece of work.

Field Report, No. 56—Foundry Equipment. Issued by AFSA, Limited, 25 Victoria Street, London, S.W.1.

This *Bulletin* is a small collection of extracts from reports from foundries expressing the satisfaction derived from the use of various types of Molykote lubricants. The uses include lubrication of roller-bearings on mould-oven cars; air hammers; dressings for die-castings and for the ball-bearings used in the de Lavaud system for centrifugally-cast pipes.

House Organ

The Forge, No. 7. Published by J. Brockhouse & Company, Limited, Victoria Works, Hill Top, West Bromwich, Staffs.

This issue carries an excellent article on the two die-casting foundries operated by Kaye Alloy Castings, Limited—one in Birmingham and the other in Presteigne, North Wales. The latter factory is mainly concerned with pressure-die-castings, and the following is an abstract from an article covering a phase of control.

One of the features of the foundry operation is the employment of the "Centralograph" system for recording continuity of machine operation. Each of the machines is connected to this system, every shot being recorded on a chart in the office with a record of the time interval. Thus the duration of any waiting time, stoppage or breakdown is shown on the chart, and each day the chart is analysed and compared with shop reports. Also at each machine is a dial of telephone type by means of which the operator can record a number on the "Centralograph" chart to indicate the reason for a given stoppage; thus dialling three may indicate an electrical breakdown while five may signify a die change.

Book Review

A.W.S. Training Manual for Arc Welding. Published by the American Welding Society, 33 West 39th Street, New York, 18, USA. (UK enquiries to Chapman & Hall, Limited, 37, Essex Street, London, W.C.2.)

This is a practical textbook for trainee electric welders which gives sufficient simplified technical information to enable the reader to understand the practical limitation and applications of the arc-welding process. A series of 30 exercises are detailed, giving full information regarding current, size of electrode and method of accomplishment for a wide range of electric-welding problems.

The care and maintenance of welding plant is discussed at sufficient length to enable the operator to diagnose the more general faults and assist in their rectification. The section dealing with "Metals and Their Structure" is fully illustrated with diagrams and visual comparison charts. Process, physical and welding metallurgy are introduced in their basic fundamentals.

D. BEYNON.

Forty Years Ago

With the exception of a series of excellent technical papers, the November 1919 issue of the JOURNAL was of poor vintage. However, an article on the making of column patterns was noteworthy for the particularly clear and informative illustrations. It is interesting to note from another article in this issue that a new American stress-testing machine was belt driven. A description was also given of an extensometer designed by Mr. (later Dr.) J. E. Hurst and Mr. G. A. Tomlinson, which the writer does not recall ever having encountered before. Amongst new companies listed in this issue were Alloy Castings, Limited and Patent Die Castings Company, Limited.

FIRTH-VICKERS STAINLESS STEEL COMPANY, LIMITED, Weedon Street, Sheffield, were awarded the Grand Challenge Cup for the best stand in the industrial section at the London Dairy Show.

Electrical Aids in Industry

Data Sheet **No. 8**

Light-Sensitive Cells

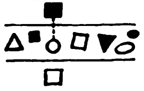
What are light-sensitive cells? They are devices which can sense and measure changes in the level of light or, in some cases, respond to the quality of light falling on them. There are various types of cell and each has its particular field of use. One of the best known is the photo-electric cell.

What can light-sensitive cells do? A change in the amount of light falling on the cell can cause a switch, relay or counter to operate. Alternatively, the direct indication of the light intensity can often allow some other factor to be determined and, if required, controlled. They are reliable and require little maintenance. Careful installation, as with all types of equipment, gives a good reward.

How can they be used? These cells have many applications in industry, for controlling processes, for inspection and measurement, for sorting material and for safety purposes:

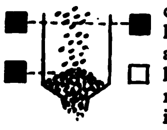
Counting

Where objects on a conveyor belt are too soft or light to operate a direct mechanical counting device, where they are too delicate or freshly painted to sustain physical contact or where the articles vary in size, a light-sensitive cell can be used. This counts the objects by interruption of an appropriately sited beam of light.



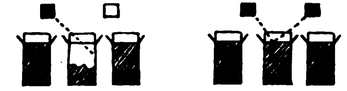
Hopper or Tank Level Control

Many forms of feed can be accurately controlled by light cells. One important one is for controlling the input to a hopper of fluid solids such as sand or peas. Here, two horizontal light beams are required: the upper, when interrupted, indicates that the hopper is full and stops the supply; the lower, when it ceases to be interrupted, indicates that the hopper is nearly empty and restarts the flow.



Package Content

The level of powder in packages can be checked with light cells. The cell is so positioned that when the powder is up to the required level, the light reflected from the surface of the powder is picked up by the cell and causes the carton to be accepted. If not, it is rejected.

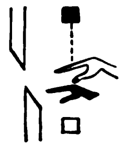


Colour Sorting

The quality of many articles can be gauged by their colour—seeds and nut kernels, for instance. The objects are fed into a tube by means of a vibrator pan and fall into the beams of three equally spaced light cells which scan them from all sides. If the object is acceptable it falls into a chute carrying it to one conveyor; if its colour is bad it is deflected as a reject.

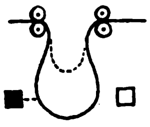
Guillotine Guard

Light cells for guarding a guillotine or power press should be used only as a supplement to a mechanical guard or where the latter is impracticable. The interruption of a curtain of light by a hand stops the machine instantaneously.



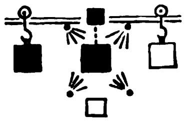
Press Feeding

Where the rate of feed of strip metal must be suited to a varying speed of acceptance by a press, a loop of the strip is allowed to sag between the feed and the press. When the loop reaches a predetermined depth a light beam is interrupted and the slack is taken up.



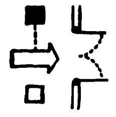
Processing Objects on the Move

Many articles are processed while on a conveyor line. For instance, where articles are to be sprayed while on the conveyor, the paint saved by stopping the gun between articles will make the device worthwhile. The same principle applies in a bakery to the spraying of baking tins with fat.



Automatic Door Opening and Closing

Doors can be caused to open or close by the interruption of a beam of light. This has its uses in such cases as control of doors on a heating oven or for the passage of vehicles in a factory. This is effected by a light beam on the side from which the approach is made (in many cases, both). When the approach beam is interrupted it opens the door which closes again after a given time interval.



For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association.

An excellent series of reference books are available (8/6, or 9/- post free) on electricity and productivity—"Higher Productivity" is an example. E.D.A. also have available on free loan a series of films on the industrial uses of electricity. Ask for a catalogue.

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Imports and Exports of Iron and Steel in September

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in September. Totals for the first nine months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended Sept. 30.	Nine months ended Sept. 30.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Cyprus	85	4,590	1,243
Sierra Leone	910	10,172	7,917
Ghana	1,286	12,113	21,034
Nigeria	3,691	49,408	54,895
Union of South Africa	2,038	75,607	30,526
Rhodesia and Nyasaland	1,061	27,906	15,454
Tanganyika	2,257	9,900	15,241
Kenya	1,907	31,266	17,515
Uganda	50	2,442	3,268
Mauritius	131	2,596	1,088
Aden	202	2,360	2,205
Bahrein, Qatar, and Trucial States	805	6,879	5,984
Kuwait	243	33,580	7,944
India	17,704	101,850	138,483
Pakistan	6,227	45,778	30,605
Singapore	2,712	25,682	17,222
Malaya	850	11,388	7,868
Ceylon	1,326	29,380	31,347
British North Borneo	85	1,707	1,870
Hongkong	4,720	43,249	49,265
Australia	5,271	75,204	59,866
New Zealand	10,007	140,167	71,760
Canada	27,292	128,719	148,530
Jamaica	1,253	16,422	15,970
Trinidad	3,649	38,178	30,926
British Guiana	638	5,656	5,140
Other Commonwealth countries	2,286	29,564	26,942
Eire	3,932	37,417	35,401
Soviet Union	7,508	14,985	20,708
Finland	3,325	38,548	26,329
Sweden	14,287	92,257	89,170
Norway	10,519	66,880	68,679
Denmark	6,229	66,328	68,879
Western Germany	14,897	35,856	90,592
Netherlands	6,546	61,203	71,209
Belgium	8,594	22,914	27,973
France	517	3,485	2,532
Switzerland	1,124	7,340	6,657
Portugal	1,080	10,984	11,610
Spain	1,136	36,060	21,454
Italy	3,395	34,046	37,877
Austria	298	8,140	2,645
Yugoslavia	334	3,400	2,614
Greece	388	10,666	8,238
Turkey	48	3,726	4,469
Netherlands Antilles	123	1,470	1,992
Portuguese East Africa	246	1,894	1.176
Egypt	20	11,729	2,150
Sudan	366	28,651	5,721
Lebanon	551	8,566	2,369
Israel	921	5,580	11,299
Saudi Arabia	8	3,649	2,866
Iraq	3,071	27,452	58,070
Iran	2,290	29,836	23,246
Burma	375	7,903	6,646
Thailand	247	5,186	6,295
Indonesia	638	1,617	4,053
Philippine Republic	1,972	2,920	6,149
USA	18,919	59,890	133,846
Cuba	315	4,318	5,236
Columbia	1,039	4,886	2,773
Venezuela	2,841	56,478	54,293
Ecuador	98	2,092	811
Peru	205	8,678	1,994
Chile	90	4,105	1,069
Uruguay	41	812	771
Argentina	19,819	108,211	161,918
Other foreign countries	29,134	91,816	214,050
TOTAL	266,132	1,989,937	2,125,937

Total Imports of Iron and Steel

From	Month ended Sept. 30.	Nine months ended Sept. 30.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	376	5,116	4,056
Canada	1,153	16,513	13,309
Other Commonwealth countries and Eire	5,021	18,558	26,815
Soviet Union	12,765	108,238	41,787
Sweden	3,129	27,822	21,336
Norway	6,328	55,592	62,169
Poland	218	173	3,723
Western Germany	9,340	62,999	53,828
Netherlands	11,622	106,889	122,462
Belgium	1,194	85,268	16,871
Luxembourg	240	5,645	4,913
France	2,012	16,176	16,387
Italy	1,687	5,337	10,973
Austria	451	3,743	3,157
Japan	228	2,777	1,958
USA	367	114,320	19,551
Other foreign countries	481	4,038	9,345
TOTAL	56,612	639,004	432,640
Iron and steel scrap and waste, fit only for the recovery of metal	21	60,415	2,509

Exports of Iron and Steel by Products

Product.	Month ended Sept. 30.	Nine months ended Sept. 30.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Pig-iron	19,827	103,557	104,966
Ferro-columbium (niobium)	7	29	30
Ferro-tungsten	92	541	899
Other ferro-alloys	1,458	2,580	6,086
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	9,510	12,521	60,087
Pieces roughly shaped by forging*	180	5,793	1,176
Iron bars, rods, angles, shapes, and sections	702	1,153	1,561
Steel bars, rods, angles, sections, and shapes	60,122	244,727	320,964
Iron plates and sheets	—	1,241	267
Universal plates	2,179	3,845	7,370
Steel plates, 3mm. and under 4.5mm. thickness	2,157	6,312	30,159
Ditto, 4.5mm. or more in thickness	21,949	132,717	142,906
Blacksheets and blackplate	24,900	210,090	190,807
Hoop and strip	4,999	51,424	61,718
Tinplate	36,992	281,685	340,746
Decorated tinplate	415	2,553	6,408
Galvanized sheets	5,110	59,438	65,094
Other (incl. tinned sheets, terneplate, and terneshoets)	1,425	10,138	16,179
Railway and tramway construction material	5,981	189,813	116,086
Wire rods of steel (incl. alloy steel)	3,434	27,212	35,957
Wire	8,660	76,277	78,409
Tubes, pipes, and fittings	55,973	566,778	520,388
TOTAL	266,132	1,989,937	2,125,937

* The figures for 1959 are not completely comparable with those or previous years.

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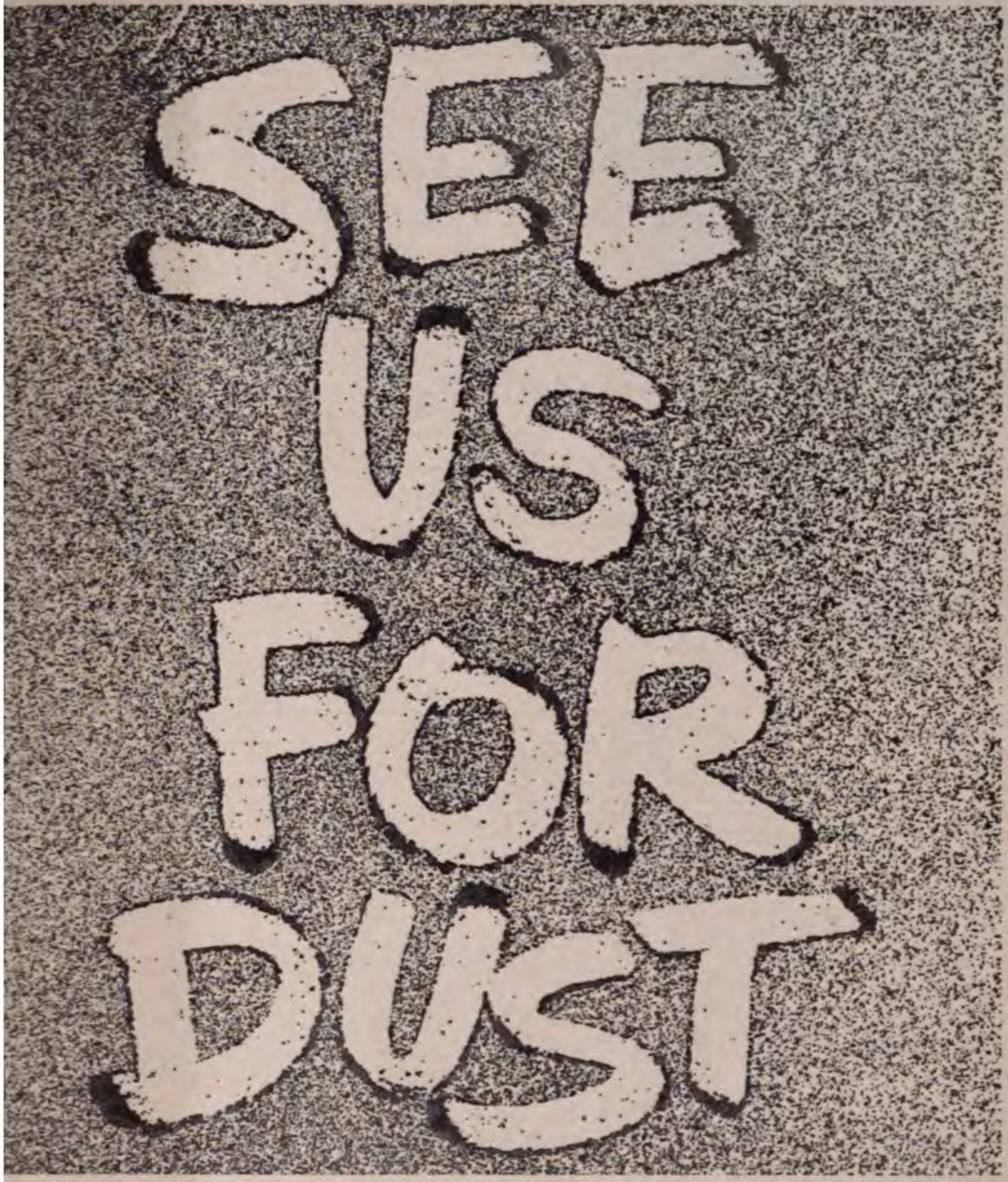

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Pig-iron and Steel Production

Statistical Summary of August Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in August. Table 3, weekly average production of finished steel in July. Table 4 gives the production of pig-iron and ferro-alloys in August, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100.			Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials						Imports.[1]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[2]
1957	328	488	537	325	303	270	275	220	14	417	322	1,444
1958	343	503	478	276	262	227	245	196	9	369	284	1,542
1959—May	342	487	478	292	236	203	240	211	8	385	285	1,457
June[3]	338	487	475	285	232	204	235	214	9	388	292	1,425
July ..	338	487	472	275	226	201	222	169	7	320	245	1,436
Aug. ..	338	487	479	264	212	193	220	172	5	337	—	1,499

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in August*, 1959.

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots[1]	Castings.	
Derbys, Leics, Notts, Northants, and Essex ..	—	4.6	14.6 (basic)	1.4	0.1	19.6	1.1	20.7
Lancs (excl. N.W. Coast), Denbighs, Flints and Ches .. .. Yorks (excl. N.E. Coast and Sheffield)	0.5	28.4	—	2.6	0.3	30.8	1.0	31.8
Lincs..	—	47.0	—	—	0.1	47.0	0.1	47.1
North-East Coast	0.3	56.4	—	0.8	0.2	56.6	1.1	57.7
Scotland	0.9	37.8	—	2.0	—	39.3	1.4	40.7
Staffs, Shrops, Worcs, and Warwicks	—	15.8	—	3.0	0.6	18.0	1.4	19.4
South Wales and Monmouthshire	1.0	70.0	5.7 (basic)	0.4	0.1	76.9	0.3	77.2
Sheffield (incl. small tonnage in Manchester) ..	4.2	24.9	—	9.0	0.2	37.0	1.3	38.3
North-West Coast	—	—	3.8 (acid)	0.4	—	4.2	—	4.2
Total	6.9	284.9	24.1	19.6	1.6	329.4	7.7	337.1
July, 1959	9.2	264.8	24.0	20.6	1.7	312.6	7.7	320.3
August, 1958	9.4	250.6	21.9	15.7	1.6	291.5	7.7	299.2

TABLE 3.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1957.	1958.	1958.	1959.	
			July.[3]	June.[3]	July.
Non-alloy steel:					
Ingots, blooms, billets and slabs[4]	5.0	4.6	3.2	4.9	4.2
Heavy rails ..	11.2	10.2	8.8	7.4	5.7
Sleepers	1.3	1.2	1.1	1.0	0.1
Fish and soleplates	0.8	0.7	1.1	0.6	0.5
Plates:					
(i) Over ⅜ in. thick	34.0	29.6	23.6	23.2	16.0
(ii) Under ⅜ in...	20.3	17.7	14.9	19.3	16.2
Other heavy prod.	53.0	41.8	29.9	39.2	28.5
Ferro-concrete bars	8.9	7.6	8.0	10.6	10.5
Wire rods	23.3	21.5	17.9	25.4	17.4
Arches, etc. ..	11.0	8.6	6.5	7.9	5.7
Other light sections	38.7	29.1	22.2	33.7	26.6
Bright steel bars ..	7.0	6.2	5.0	7.5	6.6
Hot-rolled strip ..	23.1	22.6	19.3	29.0	23.3
Cold-rolled strip ..	7.1	7.0	5.9	8.1	7.1
Sheets, ...					
(i) Hot rolled ..	13.0	10.6	9.2	12.6	11.2
(ii) Cold rolled ..	29.1	31.1	27.6	35.5	29.0
Tinplate:	18.8	18.7	18.6	20.7	23.8
Blackplate.. ..	1.0	0.8	0.8	0.7	0.9
Tubes up to 16 in...	22.1	19.0	16.5	20.1	19.0
Tube, and pipe f'tgs	0.5	0.4	0.3	0.3	0.3
Tyres, wheels, axles	5.1	4.5	3.6	2.2	1.5
Forgings (excl.drop)	3.1	2.6	2.3	2.0	1.9
Steel castings ..	4.6	4.2	3.3	3.6	3.0
Tool and magnet	0.3	0.2	0.2	0.2	0.2
Total	342.3	300.5	249.8	315.7	259.2
Alloy steel	17.8	16.1	13.2	18.8	15.1
Total from UK[5] ..	360.1	316.6	263.0	334.5	274.3
Imported steel ..	9.6	7.1	4.6	7.3	8.0
	369.7	323.7	267.6	341.8	282.3
Deduct: Intra-industry conversions[6] ..	48.2	41.2	32.4	50.7	38.5
New material ..	321.5	282.5	235.2	291.1	243.8

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total
Derbys, Leics, Notts, Northants and Essex	19	—	21.7	17.4	0.7	—	39.8
Lancs (excl. N.W. Coast), Denbighs, Flints. and Ches ..	6	—	15.3	—	—	1.4	16.7
Yorks (excl. N.E. Coast and Sheffield) ..	—	—	—	—	—	—	—
Lincs	8	—	39.3	—	—	—	39.3
North-East Coast	15	1.4	38.9	—	—	0.7	41.0
Scotland	5	—	14.4	1.2	—	—	15.6
Staffs, Shrops, Worcs, and Warwicks ..	4	—	5.7	0.9	—	—	6.6
S. Wales and Monmouthshire	9	3.0	41.3	0.4	—	—	44.7
Sheffield ..	2	—	3.2	—	—	—	3.2
North-West Coast	6	11.2	—	0.6	—	0.9	12.7
Total ..	74	15.6	179.8	20.5	0.7	3.0	219.6
July, 1959 ..	74	19.3	180.0	18.3	1.0	3.0	221.6
August, 1958 ..	84	17.6	177.4	22.9	0.2	2.9	221.0

[1] Weekly average of calendar month.

[2] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.

[3] Five weeks, all tables.

[4] Other than for conversion into any other form of finished steel listed.

[5] Includes finished steel produced in the UK from imported ingots and semi-finished steel.

[6] Material for conversion into other products also listed in this table.

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Commercial Editor:
P. E. CARDEN.

Advertising Manager:
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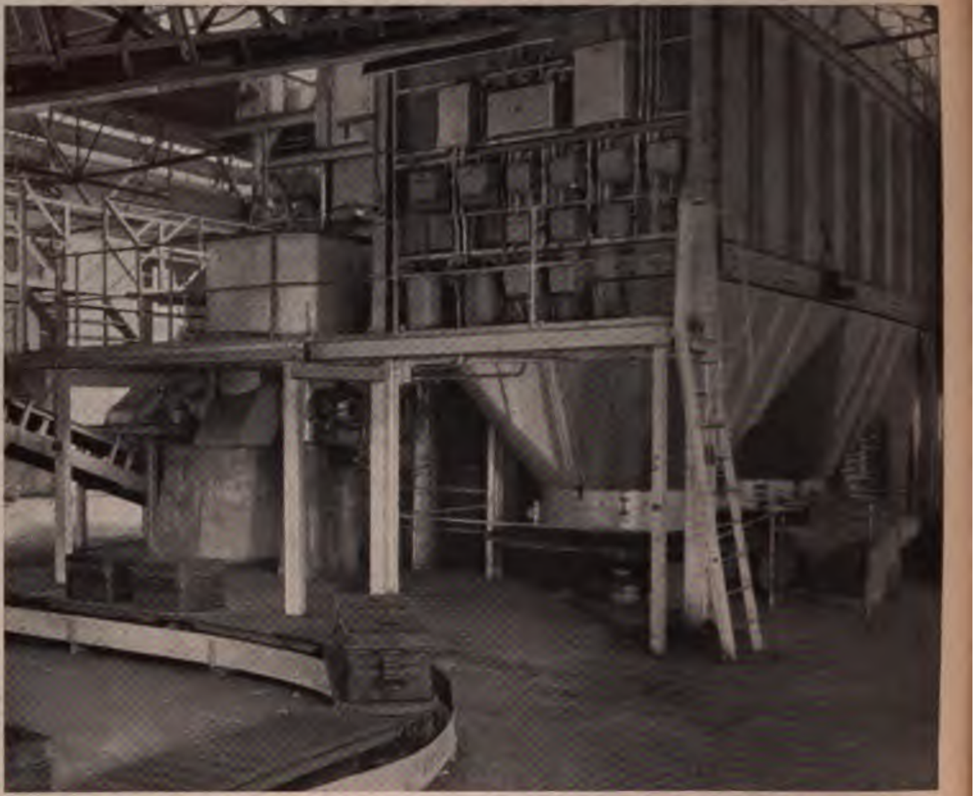

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Coal and the Future

Coal and its main derivative, coke, will, for many years to come, be an essential raw material for the foundry industry, despite the fact that, on the Continent of Europe, thoughts are being expressed in terms of energy, no matter what its source. In this new conception, two cardinal factors in European economy are the Lacq natural-gas fields and the availability of oil fuel from the Sahara, because these will further reduce the demand for pit coal. The current position is that stocks in this country, Belgium and Germany, have reached unmanageable proportions and the closing down of uneconomic mines is proceeding at an increasing tempo. Obviously, this involves the cancellation of and (throughout Europe) the general reduction in, orders for mining machinery. What was to have been the best-equipped colliery in Europe is now being left in an unfinished state, and all this, naturally, has its repercussions on the foundry industry.

A solution of this problem—suggested by the German authorities—is to concentrate on the development of pits likely to produce 2½ tons per man shift at the pit bottom. With this type of production, then coal could be competitive with all other types of fuel and the profit margin would be such as to leave cash available for development work. The situation at the moment in Europe, we were informed at a Press conference by Mr. Coppée and Mr. Lapie (who hold high office in the European Coal and Steel Community) is that the present Common Market countries' production, now 240 million tons per year, is to be reduced by 40 million tons; some 27,000 miners, mostly Italians, have become redundant. From Community funds, these men (the Italians are under a five-year contract) are to receive on a graduated scale 80 per cent of their wages for the year following their dismissal. There are rehabilitation schemes to find work for the displaced miners, one being the siting of a large brewery and the second, a plastics factory in mining villages.

All this gives a preview of what will probably happen in this country, where the problem is of the same character but of somewhat less magnitude. Here from the suppliers' point of view, there is but the one big customer, which from a commercial standpoint is bad business. We do not believe that coal is on its way out, but for it to retain or increase its competitive position coalmining will have to be drastically rationalized.

Foundry Apprentice Award

As briefly announced in last week's issue of the JOURNAL, the prize (offered by the Worshipful Company of Founders) for the best apprentice at the National Foundry Craft Training Centre was presented for the first time this year. The illustration shows the award being made at the Joint Iron Council Banquet in London, on November 3, by Mr. Reginald Maudling, President of the Board of Trade. The winner of this £25 prize was Mr. Brian Cook (right), of Wolverhampton, a 20-year-old foundry apprentice at Bayliss, Jones and Bayliss, Limited, which firm he joined in 1955.

The National Foundry Craft Training Centre at West Bromwich was established by the foundry industry in 1948, to give periodical courses during their apprenticeships to boys and young men in all branches of founding; it is the only Centre of its kind in British industry. In the "best-apprentice" contest, Mr. Cook made four good castings and his methods showed thought and craftsmanship. His method of running the three-parted handwheel and boss casting was designed to obtain a clean and stress-free casting, although more moulding work was involved than in the method chosen by the runner-up. The winner's core-positioning for the heavily-cored gearbox casting was exact and, generally, the finish on his castings was excellent, as he had tooled out minor defects in the patterns.

Forthcoming Events

NOVEMBER 16

Institute of British Foundrymen

East Anglian section:—"Precision Castings," by J. S. Turnbull, 7.30 p.m., in the Lecture Hall, High Duty Alloys, Limited, Trading Estate, Slough, Bucks.

NOVEMBER 18

Institute of Welding

North London branch:—"Demonstration and Applications of Stud Welding," by R. W. Taylor, assembly at 54, Princes Gate, London, S.W.7, 7.30 p.m., for visit to the Imperial College of Science (opposite).

Institution of Production Engineers

Visit by Loughborough College students to Stewarts & *Lloyds, Corby.*

Wolverhampton graduate section:—"Modern Developments in Steel Casting," by F. Clymer, 7 p.m., at the Wolverhampton & Staffs College of Technology.

Peterborough branch:—"Art in Engineering," by John Barnes, 7.30 p.m., in the Conference Room, Peterscourt.

Glasgow branch:—"Tool Wear and Machinability," by Dr. E. M. Trent, 7.30 p.m., at the Institution of Engineers and Shipbuilders, 39, Elmbank Crescent.

Birmingham branch:—"Production of Motor Roads" (and film), by J. J. G. Michie, followed by "Materials Handling into and through the Factory." Special evening session by the Materials Handling group, 6.30 p.m., at the Midland Hotel, Birmingham.

Institute of British Foundrymen

North East Lancashire section:—"Work-study in the Foundry," by C. M. G. Wallwork, 7.30 p.m., at the Accrington College of Further Education, Sandy Lane, Accrington.

Southampton branch:—"Properties of Copper-base Alloy Castings," by F. Hudson, F.I.M., 7.30 p.m., at the Technical College, St. Mary's Street. (Joint meeting with the Southampton Metallurgical Society.)

London branch:—"Patternmaking in Plastics," by H. G. C. King, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.

NOVEMBER 19

Institute of Vitreous Enamellers

Midland section:—"Wet Process Enamelling of Cast Iron," by E. R. Evans, 7.30 p.m., at the Birmingham Exchange and Engineering Centre.

Institution of Plant Engineers

Blackburn branch:—"Building a Modern Factory," by P. Wyatt, 7.30 p.m., in the Castle Hotel, Blackburn.

NOVEMBER 20

Institute of British Foundrymen

Bristol and West of England branch:—"Modern Sand Practice," by W. B. Parkes, 7.30 p.m., at the Royal Hotel, Bristol.

London branch:—Dinner/dance, 6.30 for 7 p.m., at the Café Royal, Regent Street, London, W.1.

Dinner

BRITISH BRONZE AND BRASS INGOT MANUFACTURERS ASSOCIATION

The annual dinner/dance/cabaret of the British Bronze and Brass Ingot Manufacturers Association was held at Grosvenor House, London, last Saturday. The president, Mr. James H. Barwell, J.P., was in the chair and with him at the high table were Mr. A. J. N. Brown (president of the Association of Bronze and Brass Founders); Mr. Leonard H. Cleaver, M.P., J.P., Dr. A. B. Everest, Mr. D. Carter (Board of Trade), and Mr. J. K. Lion (president, National Association of Non-Ferrous Scrap Metal Merchants), most of whom were accompanied by their ladies.

The toast to "The Guests," proposed by the chairman, was replied to by Mr. L. H. Cleaver who, now that he is a Member of Parliament, is no longer a partner in the firm of Heathcote and Coleman which acts as secretariat for the BBBIMA; Mr. F. W. Sims will now be acting for the secretaries of the Association. At the conclusion of the dinner, the guests danced to the music of Sydney Lipton's orchestra and were later entertained by Frank and Peggy Spencer and their dancing team, and Raphael and his model.

CONTRACTS WORTH OVER £50,000 have been placed with Taylor Woodrow (Arcon), Limited, of Welbeck Street, London, by Ransomes & Rapier, Limited, engineers, for the supply and erection of three steel-framed buildings at their Ipswich works. Of these buildings, one, 90-ft. high, will be a heavy fabrication shop for the manufacture of the largest type of excavator. It has been specially designed to house two 60-ton cranes.

ladrid Congress

y-to-day Account of, and Comments upon, the Twenty-sixth ernational Foundry Congress in Spain (*October* 4 *to* 10)

This year, it fell to the lot of Spanish foundrymen to act as hosts for the twentysixth annual Congress of the International Committee of Foundry Technical Associations. The meetings were held in Madrid during the week commencing October 4, the whole proceedings being organized through the *Instituto del Hierro y del Acero* **(Spanish Iron & Steel Institute, whose fourth annual general meeting ran concurrently). The Editor of the** JOURNAL **attended personally and what follows is his condensed report on the proceedings.**

he 26th International Foundry Congress was in Madrid from October 4 to 10. Concurrently it, there was held the fourth annual general ting of the *Instituto del Hierro y del Acero* (the ish Iron and Steel Institute)—a body covering nical associations and research activities of both and steel and foundry industry. The organizing mittee was headed by His Excellency, Agustin a Sancho, with Mr. J. A. Andrés as secretary. latter's help to the delegates was invaluable.

Registration

ne office for the registration of some 1,300 gates from 21 nations was opened at the *Dele-* *n National de Sindicatos* on Sunday morning. as here learnt that the lorry bringing some of locuments from the University City had broken n. However, splendid amenities had been pro- d and quite soon the enormous mass of papers duly handed over. It contained, *inter alia*, the erence badge, a well-bound guide to Madrid for adies, notebook, and a neat folder for carrying documents. The inclusive registration fee gave everybody tickets for every event and to avoid over-provision, it was necessary to k up for each specific item on the programme. llent provision was made for coping with the ous languages. It was learnt that, owing to of support, the post-congress tour to the Bar- na area had been cancelled. The rest of Sunday Monday was left free for sightseeing, though international sub-committee meetings were held he Monday afternoon.

took the visitors from the North but little time et used to having dinner (or should it be er?) between 9 and 11 o'clock in the evening, ite the fact that the programme allowed but time for the mid-day siesta.

Opening Ceremony

The opening ceremony was held on Tuesday morning in the great hall at the *Sindicato*, the seats being furnished with simultaneous translation telephones. The opening address was delivered by Dr. A. Dacco who, speaking in his capacity as president of the International Committee of Foundry Technical Associations, said he was both pleased and honoured to bring to Madrid the greetings of the 21 associations which to-day formed the Committee, as well as to express his thanks to the

View of the building in which all the main and sub-committee meetings of Congress week were held. Known as the " Sindicato," it is the usual venue in Madrid for both employer and employee meetings.

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device in the heading comprises two motifs: the upper representing the 26th International Foundry Congress, wer section the fourth general meeting of the *Instituto ierro y del Acero* (Spanish Iron & Steel Institute).

delegates for coming there from all parts of the world to participate and to add prestige to the 26th Congress. He thanked the *Instituto del Hierro y del Acero* for organizing the Madrid Congress, especially the directors and their colleagues.

He recalled an earlier Congress, held in Barcelona as long ago as 1928, and said that some of those in that earlier audience were present this year, for example, Mr. Plana, Mr. V. C. Faulkner and Dr. A. B. Everest, who had taken a prominent part in its activities, though at that time somewhat less prominent and much younger. At that time, they were imbued with faith in the development of new techniques and the need for international conferences for their wider dissemination, to facilitate the exchange of experience and to strengthen those personal contacts which had invariably proved themselves to be such a positive force for progress and for the well-being of the industry.

The Committee, founded by a few enthusiasts in 1927, soon enlisted Spain as a member country to join the original eight. It had grown with the development of new techniques and scientific discovery, and it was now realized that it was necessary for the world's technologists to acquaint themselves with foreign work and to impart to others the results of their researches and to do this unselfishly. The Committee would be truly international when it represented all the countries which had a developed foundry technique. At present, it included 21 national associations with a total membership of 45,700 members and a production estimated at 28,000,000 *tonnes* of iron castings and 2,100,000 *tonnes* of non-ferrous cast components. Other national associations should certainly join and make their contributions in order to enhance the value of the papers and discussions. They, too, could make valuable contributions to the work of the various technical committees, including the International Foundry Dictionary.

During his year of office, he had become convinced of the need to enlarge and adjust the functional structure of the Committee, from the secretariat to its committees. He felt sure that the delegates from the member associations would appreciate the problem and would solve it with both promptness and vision, and so align the work to keep step with the rhythm of modern life.

Recalling the work of the previous Congresses, spread over the last 34 years, a major factor had been its growth in importance, the incidence of mass-production, the improvement in working conditions. He made a plea for authors of papers to send them very early to the organizers in order that they could be translated and be in the hands of the delegates in good time. In this way they could be studied and intelligently discussed. He then underlined the benefits to be derived from visiting plants and informal discussions, as they could only lead to the increase of knowledge.

Before he closed, he expressed a desire to thank all those who had co-operated and were co-operating in the work of the Committee. These included the past-presidents, the chairmen of the various committees, the Institute of British Foundrymen, which body had from the inception of the organization provided without cost the secretariat, recalling in this connection the excellent work of the late Mr. Tom Makemson. He also thanked Mr. G. Lambert, the present honorary secretary, the convenors of the various sub-committees and to the authors of the papers. Stressing the value of personal international friendships, he concluded by saying that as the stay in Spain was now starting, the best wish he could make to everybody (including the hosts) was that foundrymen would be glad to have spent it there, because of the new ideas gained, because of the friendships cemented, and new ones made. The visitors would, he felt sure, leave Spain nostalgic, because of the wealth of natural beauty and culture there, her warmhearted kindly people, and the all too generous hospitality. To them he wished, in the name of the delegates, to extend his heartfelt good wishes for their future prosperity.

Address from the Congress President

The president of the Congress, His Excellency Agustin Plana Sancho, in his reply, said that to all participants in the 26th International Foundry Congress and the 4th meeting of the Spanish Iron and Steel Instituto, his first words were that of greeting—a really warm welcome to all those who had come from all quarters of the globe. This was the second congress to be held in Spain, the first being held in Barcelona, and was for the Spaniards an occasion of first importance. At the last congress, held in Brussels, the immediate past-president, Dr. G. Schwietzke, had given a really fine discourse on the theme, "The Foundry in the Service of Mankind." It was impossible to give a more exact or just definition of the object of the industry and the work of its employees. In truth, they were all engaged on working for the good of humanity. Here in Spain, it was not only the casting of iron and non-ferrous alloys that was under consideration, but as the past-president said, the betterment of humanity. It was often assumed that Spain was an ungovernable country, but he pointed out that if a married couple were quarrelling, it was unwise to interfere for immediately they would combine against the person interfering—that was Spain. The great need of the world was peace and after enlarging on this subject a little, he concluded that the object of this Congress should be "The Foundry in the Service of Mankind and of Peace."

He insisted that there in Madrid the nations of the world and the men of science were working for the perfecting of foundry practice, methods of working, and for the good of humanity. The *Instituto*, which included foundry activities, sincerely hoped that the work of the Congress would be fruitful. He thanked the delegates for attending in such large numbers. He told his audience how the *Instituto* came into existence a few years ago. Its first office occupied a storey in Villanueva Street; now they had their own well-equipped research laboratories and offices in the University City, where satisfactory progress was being made, catering as it did for all alloys. Whilst this was a co-operative effort, he was proud

(a) The British delegation, Mr. H. Hallett, Mr. C. H. Wilson and Mr. V. C. Faulkner, at the meeting of the International Committee of Foundry Technical Associations. (b) The president, Mr. A. Plana Sancho, and (left) Mr. Andrés Jimenez at the same meeting. (c) Mr. Andrés and the Spanish ballerina Carmen Amaga at one of the evening functions. (d) Dr. Dacco, of Italy, the president of the International Committee, addressing the assembly. (e) Mr. and Mrs. V. A. Rahbek, of Riba ironfoundry, Denmark, at one of the sessions.

of the part he had taken in its creation and development.

He thanked Dr. Dacco on behalf of the Congress and presented him with a gold Congress badge, as this metal represented the nobleness of the *Instituto* sentiments of friendship and was a recognition of his personal character. He then announced that the head of the State—General Franco—had accepted the position of honorary president of the Congress, and he expressed his appreciation of this high honour bestowed upon it.

He then welcomed the Minister of Commerce and asked him to address the audience. He gave some statistics of iron and steel production, saying the former had increased by 64 per cent. during the 1940-57 period—in 1958 963,000 tons had been produced. Steel during the same period increased by 75 per cent. and the 1959 production was 1,427,000 tons. The mining industry, for iron, copper, lead and zinc, had always been important, yet the reserves of iron were still enormous. Coal production was increasing, but the pits needed heavy capital expenditure for their modernization. The automobile industry was developing and a new aluminium industry had been created. Housing was a problem as there was still a shortage of raw materials, but good progress had been made.

At the conclusion of the ceremony, a film was shown, as Mr. G. Delbart's lecture was postponed until Friday.

Visit to Iron and Steel Institute Laboratories

At four o'clock, the whole of the delegates set out in a veritable caravan of motor coaches on a tour around the city of Madrid which terminated at University City, where the offices and laboratories of the *Instituto del Hierro y del Acero* (Spanish Iron & Steel Institute) have recently been installed. The buildings are indeed imposing, whilst the offices are magnificently furnished. The laboratories are adequately, but not extravagantly, equipped, and are very well servicing the Spanish iron and steel industry. The accent at the moment is on the provision of standardized samples of material to the works chemical laboratories, in order to ensure reliable analyses of the iron, steel, etc., being manufactured, and on the basic principles of works management. These are very wise preliminary steps to take and will form a sound background for future progress. Good provision has been made for mechanical testing, for microscopic and heat-treatment studies, as well as work on refractory materials. It was intended to have a snack meal in the grounds, but as the weather was dull, an army of waiters invaded the building and in every office and laboratory an excellent meal was efficiently served. The day was rounded off by a gala entertainment at the Zarzuela Theatre, when the curtain rose about 11.15 p.m. on Carmen Amaya's delightful Spanish Ballet. For those who had never seen the touring shows of Spanish dancers at home, this was a refreshingly different entertainment and was highly appreciated by the huge audience.

Wednesday, October 7

Wednesday was devoted to technical sessions, special lectures, a visit to the Higher Council for Scientific Research, and (for the ladies) an excursion to Toledo. Not a few of the men decided to join the ladies, salving their consciences with the thought that another opportunity might never occur of seeing this marvellous city, its wonderful cathedral and glorious examples of some of the old masters. The writer was amongst the backsliders.

The evening was spent as the guests of the Lord Mayor of Madrid at a reception staged in the Cecilio Rodriguez Gardens—a part of the famous Retiro Park. This took the form of an *al fresco* orchestral entertainment by the City Band in idyllic surroundings. There was neither a formal reception nor speeches, but at the conclusion of the entertainment, excellent snacks and champagne were served.

Thursday, October 8

Nine o'clock, October 8, found this scribe at a meeting of the past-presidents of the International Committee of Foundry Technical Associations. In recent years, this has been a sort of executive committee which suggests the business for confirmation by the main body meeting at 3 o'clock in the afternoon.

International Committee Meeting

The meeting was presided over by Dr. Dacco, and after the usual formal business of apologies and minutes, he welcomed the new member from Hungary. Next, Russia was admitted to membership. The award of honour from the International Committee was accorded to Mr. Plana, the president of the Congress, who had been so prominent in international circles for nearly thirty years. It was announced that the trophies so generously given by Signor M. Olivo would cease after 1960, and that the large statue of Perseus would from thereafter find a resting place in the headquarters of the Committee.

Zurich Congress, 1960

Mr. G. L. Guyer then gave details of the next conference to be held in Switzerland next year from September 19 to 24.* Briefly, it is being organized jointly by the Association of Swiss Ironfounders and the Association of Swiss Metal Founders. On Monday, the opening ceremony at 11.30 a.m. will be followed by a cocktail party, and there are to be technical sessions during that afternoon (with simultaneous translation of the papers to be presented). The Tuesday of Congress week will be taken up with works visits, whilst the Wednesday will be devoted to technical sessions. At 6.30 p.m. on Wednesday there is to be a cocktail party and at 8.30 p.m. a banquet followed by a variety show. On Thursday, there is to be a trip on the Lake of Lucerne, whilst on Friday, there are to be more works visits and technical sessions. The official closing ceremony will take place on Saturday morning. Post-congress tours have been planned.

Resignation of Secretary

Mr. G. Lambert tendered his resignation as honorary secretary, and in recognition of his sterling work in that capacity.

Group of Congress delegates in committee: (left to right) Professor Ove Hoff (Denmark), Mr. Navarro Alcacer (Spain), Mr. S. C. Massari (USA) and Mr. Kalevi Raunto (Finland).

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* See JOURNAL, October 29.

f the general assembly of delegates attending the Madrid Congress (there were over 1,300 *registrations from all parts of the world).*

as presented with a silver cigarette box and nsignia of the Congress. After Mr. Lambert expressed his thanks, Dr. P. W. Muller of h was elected secretary, his term of office ng on January 1 next year. In order to pay he new secretariat, the subscription for next was raised to $200 (about £70).

Election of Officers

. F. W. E. Spies was elected president for the 1960, and Mr. Plana, vice-president. The ary treasurership is to be in the hands of Mr. uilleumier of Switzerland.

er a quantity of other business had been cted, votes of thanks were passed to the hosts o Dr. Dacco for the work he had put into the nittee during the past year. During the meet- ne delegate queried the policy of leaving so to the past-presidents' committee.

er that evening, the president of the Congress, Plana, entertained to dinner the official dele- at the Ritz Hotel. It was a well-groomed ion, much enjoyed by the guests. There was one speech, that by the chairman who, in the gracious terms, proposed the health of the . He finished by presenting the first bouquet e lady on his right, the rest being rapidly buted to the others.

Friday, October 9

Friday was a busy day for both the delegates and their wives. The former had technical sessions in the morning and a works visit to Empresa Nacional de Autocamiones, makers of small lorries. The latter had visits to a museum and a mannequin parade, whilst both attended the closing banquet and dance.

The closing banquet and dance was held at 10 p.m. in a hall of the medical faculty located in the University City, which is quite a long way from the centre of Madrid. Whilst there was something of a squash in the anterooms, immediately one entered the large hall, the organization was brilliant. It is not easy to serve meals to over 1,000 people, but never were so many fed in such a short space of time. Moreover, the banquet was of the highest standard and at its close, the ladies were presented with a Toledo-ware brooch and the men with a paper-knife taking the form of a Toledo sword.

Saturday, October 10

Technical sessions once again took up the morning, starting at 9 a.m. At 5 p.m., there was the closing ceremony. It was presided over by Mr. Plana and honoured by His Excellency the Minister of National Education, who represented the Head of the State. The first speech was by Dr. Dacco, whose Italian eloquence was so well suited to express the thanks of everybody to the hosts, the

Madrid Congress

organizers, to Mr. Andres, the indefatigable secretary and to Mr. Lambert. Nobody was forgotten and all received the praises and thanks they so well merited. Finally, he presented to Mr. Plana the statuette of Perseus, so kindly given for so many years by Commendatore Mario Olivo, who was called to the rostrum to add his tributes to the worth of the recipient. Mr. Plana, in reply, said he was particularly delighted to receive this award as it was a personal one and placed him amongst a list of illustrious foundrymen. He started his career at Altos Hornos di Vizcaya, where he became foundry manager. Here, following the lead of Senor Sans he was successful in turning out first-class rolls and ingot moulds. He paid a tribute to Mr. Jose Navarro Alcacer, who, as head of the foundry section of the Iron and Steel Institute, had done so much to forward the work of international co-operation.

In formally closing the Congress, he reviewed the work done by all sections. He cast his mind back to an international congress held in Liège in 1925, where he found himself being supported in his arguments by Professor Portevin. Then, in Barcelona in 1928, a congress was held under the presidency of Mr. Cesar Sorrano. He tried in conjunction with Senor Espana and Professor Portevin to popularize the Frémont test-piece as modified by the national gun-mounting shops. He hoped to see a revival of interest in the Frémont test. Finally, he thanked all those who had helped to make the Congress a success.

Works Visits

In Madrid, only one works was visited—that of the Empresa Nacional de Autocamiones, S.A. It operates a foundry which has been mechanized by Foundry Equipment, Limited, for making lorry castings. The company employs between 2,000 and 3,000 employees and *inter alia* is making 250 small tracks a month. However, this production is well capable of expansion with the existing plant, as added experience of quantity production is gained.

S.A. Vers-Malaga

Outside the gates of this large wagon building and repair shop is a gipsy encampment, located between the railway and the seashore. The natural bathing facilities readily available have made no impact whatsoever on the large nude and semi-nude juvenile population. The size of the works can be judged by the fact that each year they make 450 new wagons, and repair and modify a further 3,500. The foundry operates two 4-ton per hr. and a 16-cwt. per hr. cupola, and 50-cwt. electric furnace. The hearth of this furnace was at the time of the visit being fettled with wet dolomite—a feature never previously encountered. It was interesting to learn that this firm is making under licence, from Forni Tagliaferri, low-frequency induction furnaces.

Sociedad Espanola de Construccion Naval—Cadiz

This is a typical marine-engineering establishment, manufacturing ships and the usual range of engines and machinery associated with this industry. It is the San Carlo branch of a company with plants at Sestao, Bilbao, Reinosa (Santander) and Matagorda (Cadiz), the four works employing some 10,000 operators. It contains iron, steel and non-ferrous foundries, the two latter being housed under one roof. The outer door of this shop framed a well-proportioned palm tree. Here, amongst other electric furnaces was one of the Greaves Etchells type. Mr. Etchells during the 1914 war installed at

Meeting of the Dictionary Sub-committee of the International Committee of Foundry Technical Associations, presided over by Mr. Mario Olivo. On his right are Mr. Laine (France), Mr. Vuilleumier (Switzerland) and Mr. Hallett (Great Britain). Mr. G. Blanc, the honorary secretary, is on the president's left.

the Reinosa works one of his furnaces—perhaps this one. It was the second to be installed in Spain, the first was at Altos Hornos de Vizcaya and was put into commission by the writer. Not only does the company undertake marine engineering, but is now making Asquith machine-tools under licence.

S.A. de Construcciones Agricolas Seville

This was a thoroughly modern agricultural implement foundry which had been partially mechanized by Bonvillain & Ronceray of Paris. Shell moulding and the CO_2 Process were highly developed, whilst the cupola was being instrumented for hot-blast practice. The consultant, who is also a Professor at the Seville Technical College, was a Glasgow-trained man. He knew exactly what new plant was needed, and like industry in general in Spain, awaited an improvement in the foreign currency position.

General Notes

Firms supplying foundry plant to Spain must ensure that its production is elastic. Several foundries used their melting plant to make both ingots and castings. This applies to steel and non-ferrous material. Because of the difficulty of foreign purchases, many firms have concluded arrangements for Spanish firms to build plant under licence. Such an arrangement has been made by British Moulding Machine Company, Limited, and a substantial foothold has already been gained in this market. Finally, the Spanish foundry executive is well informed on the latest technical developments, has made up his mind as to his requirements, and will place orders as soon as trading conditions allow.

Ladies' Programme

Those ladies who were fortunate enough to accompany their husbands to Madrid will long remember the very generous programme which was arranged for them and the many touching courtesies extended to them by their Spanish hosts. Sweet nosegays greeted them on every possible occasion and the little gift book on Madrid and its surroundings, so charmingly bound and inscribed, was a stroke of genius. No lady went on a visit without her "little bible" as it became affectionately known and many husbands, kept busy at the *Syndicato* or *Instituto*, will be able to enjoy its pages by their own fireside during the coming months. Visits arranged for the ladies included a tour of the Prado which, though short, was sufficient to catch a glimpse of the masterpieces of Spain's most famous artists, Goya, El Greco and Velasquez, with an unhurried few moments to marvel at the unforgettable "Las Meninas." It was a little unexpected delight to find amongst the Primitives a picture of St. Eloi, one of the Patron Saints of founders, illustrating the traditional story of the two golden crowns. The visit to the Prado was followed by a tour of the Royal Palace, and here amongst all the other priceless treasures, it was especially interesting to see a whole room entirely faced and furnished in ceramics from the old "Buen Retiro" factory which once stood on the site of the main Post Office, hard by the Retiro Gardens.

Further afield, the visits included a day at Toledo, the whole of which is a national monument and which is packed tight with buildings of tremendous historical interest and superb El Greco pictures. Scarcely anyone left without a souvenir made of the famour Toledo craft, which had been seen in the making at a small workshop earlier.

On the next day, a visit was arranged to the *Escorial*, that magnificent and austere monastery and pantheon placed so dramatically in the foothills of the Guadarrama mountains. The austerity was even further enhanced by a mountain mist which, however, quickly dispersed. One could not fail to be impressed by the fearful singleness of purpose and strength of mind of a king who spent his last days of failing health living in the utmost simplicity and discomfort, watching from his crude invalid chair strategically placed on the opposite hillside, as the workmen built what was to be his greatest monument and final resting place. Scarcely had one ceased musing on the burial places of kings and wakened from a little siesta when the coach arrived at a burial place of another sort, the very newly completed basilica and Valley of the Fallen. This huge memorial hewn out of the rocky hillside and surmounted by an incredibly high cross, is placed at the head of a very beautiful valley and is dedicated to all those who gave their lives for their country in the recent "War of Liberation."

The week's programme ended with that very feminine institution—a mannequin parade. Shown during tea at the Palace Hotel, the collection was presented by one of Madrid's leading courturiers and it was a delight to see such lovely clothes on even lovelier girls.

The ladies of 21 nations will remember, with a deep sense of gratitude and privilege, the occasion of the 26th International Congress which was so happily centred in Madrid and which gave them so unique an opportunity to enjoy some of Spain's treasures of art and architecture.

House Organs

Sankey Vendo News, No. 5. Issued by Joseph Sankey & Sons, Limited, Hadley Castle Works, Wellington, Shropshire.

This is a special edition prepared in connection with the Dairy Show (held in London, October 27 to 30), which stresses the potentialities of the milk-vending machines manufactured by the company.

Ingot, September 1959. Published quarterly by Richard Thomas & Baldwins, Limited, from 82, Brook Street, London, W.1.

The reviewer finds it difficult to visualize the class of reader this house organ is meant to interest. It makes no special effort to tell the employees of the usual sporting and social events, nor does it set out to emphasize to customers the worth of the products of the company; yet it has for the general reader a distinct appeal. It is well produced, beautifully illustrated in colour and very well written. Speaking as a general reader, the reviewer thoroughly appreciated the contents of this obviously prestige magazine.

Equipment & Supplies

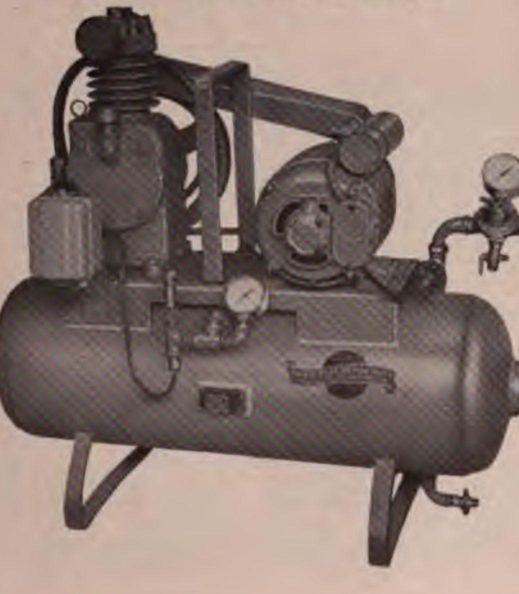
Barrel-type Shotblast

Hepburn Conveyor Company, Limited, Rosa Works, Wakefield, are now manufacturing a very large and heavy-duty barrel-type shotblast unit, specially designed for handling sizeable castings. The new model is the Pangborn 72 cub. ft. Blastmaster which is reported to be capable of handling ton-size castings in loads up to 5 tons. In this unit, two large (5-in. wide) Rotoblast impeller wheels, powered by 40-h.p. motors, hurl 60 tons of metal abrasive per hour—said to be more than any other batch-type barrel ever built—against the castings to be cleaned. It is claimed that this unit permits fastest and lowest-cost cleaning of castings of a size previously considered too heavy and bulky for tumble-blasting. Pangborn's patented abrasive-separator is incorporated to eliminate the excessive wear on wheel vanes, caused by inadequate removal of sand and dirt from the re-cycled abrasive. A solid-plate, abrasive-tight door of a completely new design retains abrasive inside the machine, and wheel-housings and blast chamber are lined with special wear-resisting material, the drum ends being of manganese-steel. The horse-power of the motors used on shaker conveyor, power door and abrasive elevator range from double to triple that used on conventional machines of this type. Lower labour costs are also claimed in the use of this model, where push-buttons replace manual work. The castings conveyor is the heaviest-known apron-type conveyor ever built and is made to permit the use of two supporting chains instead of four. Troublesome centre chains have been eliminated so as to remove a further source of high maintenance costs.

Respirator

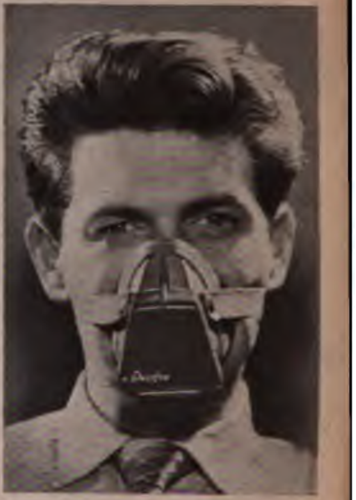
The Dustfoe 66 respirator, manufactured by Mine Safety Appliances Company, Limited, Queenslie Industrial Estate, Glasgow, E.3, has recently been granted H.M. Factory Inspectorate Certificates approving its use under the Iron and Steel Foundries Regulations 1953. The latest model of the respirator has a contoured face cushion which gives a natural fit and good wearing comfort. This sponge cushion is easily replaceable.

FIG. 1.—*Small automatic air-compressor, made by Bellanger Bros. (London), Limited.*



The exhalation valves now fitted to the respirator are larger than those used previously, and reduce resistance to a minimum. Static web filters treated with an electrostatically-charged resin are incorporated. The filter holder is narrow, which minimizes blind spots and gives greatly increased downward vision. The complete respirator, including the headband, weighs only three ounces. The band is a two-piece elastic type with positive locking, slide-band adjustment and easy snap action with D-ring release.

FIG. 2. — *Improved respirator manufactured by Mine Safety Appliances Company, Limited, of Glasgow.*



Air Compressor

Bellanger Bros. (London), Limited, 306, Holloway Road, London, N.7, have introduced a small automatic air-compressor plant (see Fig. 1). The machine has an automatic stop/start pressure switch, airfilter, moisture separator, pressure controller with both high- and low-pressure dial gauges, all the usual tank fittings and a receiver to the latest B.S. specifications. The motor is television-suppressed, and the machine is claimed to operate very silently.

Electronic Weigher

Electroweighers, Limited, Moseley Street, Birmingham 12, are marketing a heavy-duty automatic and continuous weigher. The operating technique involves the use of a dustproof load cell, incorporated in a single idler weighbridge. The weight of the burden on the conveyor belt pressing on the cell induces an unbalanced voltage, which, when amplified, gives direct readings of the momentary load. An additional voltage from a tacho-generator, driven on the return belt, is multiplied and integrated with the oscillator voltage. The resultant sum, *i.e.*, total burden conveyed, is indicated by means of counters. High accuracy is claimed.

R.C.I. to distribute Philips Industrial Products :

With effect from November 1, Research and Control Instruments, Limited, Industrial Products Division, Instrument House, 207 King's Cross Road, London, W.C.1, became the sole distributors in the United Kingdom for the industrial products at present marketed by its associated company, Philips Electrical, Limited. R.C.I. will also take over the responsibility for the maintenance of existing Philips equipment.

Quick-drying Primer: Arthur Holden & Sons, Limited, Bordesley Green Road, Birmingham, 9, are now marketing a general-purpose grey primer, with a drying time of only 10 min., which can be applied to most metals and to hardboard.

Construction of an Oil-fired Reverberatory Furnace for Melting Aluminium

By G. A. Hodges*

During a recent survey[1] on the working conditions in 14 non-ferrous foundries, observations made showed that good working conditions could result from efficient furnace design. In consequence, a new oil-fired reverberatory furnace was designed which could replace the conventional crucible-type bale-out furnaces used for melting aluminium. Kent Alloys, Limited, of Strood, Kent, decided to build one of these new furnaces, and to subsequently investigate the possibilities of a cast-in-situ refractory concrete (backed by insulating concrete) as a lining to the bath. The work done at Strood is described below.

A thermal environment survey[1] was recently carried out in which an experimental furnace to melt 250 lb. metal was built, constructed in such a way that the flue gases preheated the metal. The efficiency of this furnace was compared with the bale-out furnace which it replaced. The same alloy was melted in two furnaces, they served the same pressure-die machine, and used the same fuel. It was found that the reverberatory furnace replaced both the melting and holding bale-outs, and gave slightly more metal than the pressure die could take. Thermal efficiency figures obtained were 13.55 per cent. for the bale-out, and 28.65 per cent. for the reverberatory. Working conditions in the vicinity of the reverberatory furnace were considerably better than around the bale-out furnaces.

In view of the success of the 250-lb. furnace a second furnace was designed, to melt 600 lb. aluminium. Oil was burned in a combustion chamber above the bath, which was so designed to give a rotary movement to the flame, which played directly on to the metal. The flue system was arranged so that the effluent gases preheated the metal fed into the furnace. The metal was fed in at two levels, the lower shelf being used for ingots and the upper one for "dirty" scrap. Thermal efficiency figures for this furnace are given as 31.9 per cent.

REVERBERATORY FURNACE

Kent Alloys, Limited, of Strood, Kent, obtained the drawings of the furnace designed for the thermal environment survey, and the metal shell was constructed. This furnace had been made with a 600-lb. capacity, but as 400 lb. was considered adequate for the necessary production at Kent Alloys, the size of the bath was modified slightly, by raising the hearth 3 in. to give the required capacity (see Fig. 1).

Construction of the Bath

The construction of the bath was as follows. A 3-in. thickness of loose fill of calcined diatomite was placed on the metal floor of the furnace, and the suction thoroughly tamped out with water. On top of this a 3-in. thickness of insulating concrete was cast, using a mix of 1 part Ciment Fondu to 4 parts calcined diatomite ($\frac{3}{16}$ in. to dust)† by volume. Thin steel strips were then positioned round the walls 3 in. from the steel shell, and insulating concrete cast in to give a 3-in. lining against the shell.

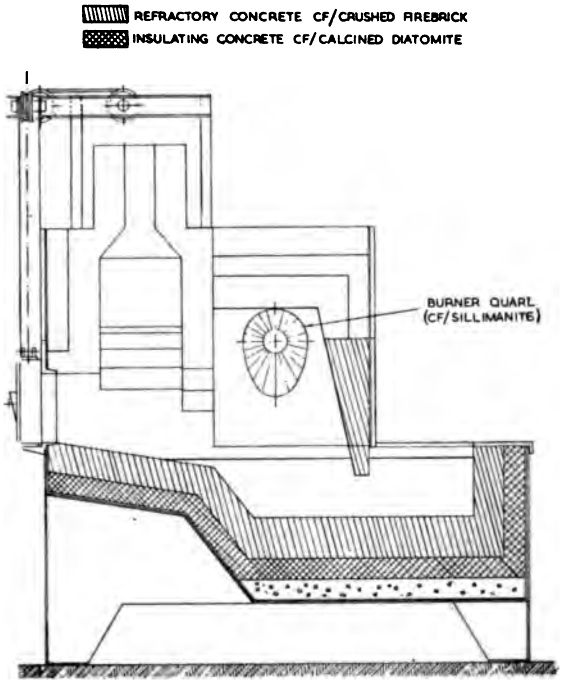

▥ REFRACTORY CONCRETE CF/CRUSHED FIREBRICK
▩ INSULATING CONCRETE CF/CALCINED DIATOMITE
1
BURNER QUARL (CF/SILLIMANITE)

FIG. 1.—*Drawing showing the materials used in the reverberatory furnace installed by Kent Alloys, Limited, for melting aluminium.*

The rest of the floor was filled in with a Ciment Fondu refractory concrete consisting of 1 part Ciment Fondu : 2 parts $\frac{1}{8}$-in. to dust crushed firebrick; 2 parts $\frac{3}{8}$-in. to $\frac{1}{8}$-in. crushed firebrick (by volume) to form the floor of the bath. The thin steel strip separating the two types of concrete was raised while the concretes were still wet and the surface lightly tamped to consolidate them, so that they would combine and harden together forming a composite structure. The walls were cast in a similar manner to give 3 in. of insulating concrete against the steel, with an inside thickness of 4½ in. of refractory concrete for the inside hot face of the bath.

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* Mr. Hodges is die-shop superintendent at Kent Alloys, Limited, of Strood, Kent.

† Throughout this article such figures indicate the particle size, *i.e.* all the material passed through a $\frac{3}{16}$-in. mesh.

Curing

The complete bath and ramp were cast in about five hours by three men, the whole of the concrete being hand-mixed. Curing was effected by filling the bath with water when the concrete was sufficiently hard, about two to three hours after placing had finished. The amount of concrete used in the bath was approximately 8 cub. ft. of insulating concrete and 12 cub. ft. of refractory concrete.

Other Furnace Parts

Other parts of the furnace for which a refractory concrete was used were the burner quarl and the wall of the combustion chamber immediately above the hearth, the bottom part of which formed the dam separating the bale-out portion of the furnace from the melting part. A higher-refractory concrete was necessary for the burner quarl, and this was obtained by using sillimanite (a more refractory aggregate than crushed firebrick) in a mix of 4 parts ⅛-in. to dust sillimanite : 1 part Ciment Fondu (by volume). It was considered that the dam would be subjected to rather severe conditions, particularly from flame scour on the inside edge, and it was decided to make this from a Ciment Fondu/fused-alumina mix, whilst the mix for the upper part (which formed the front wall in the combustion chamber) was the same Ciment Fondu/crushed firebrick mix that was used for the bath. Drying-out of the furnace was gradual, a low flame being used from the burner, and holes were drilled in the bottom of the steel casing to allow the water driven off from the concrete to escape. After drying out for two to three days, the furnace was taken up to temperature and aluminium melting commenced.

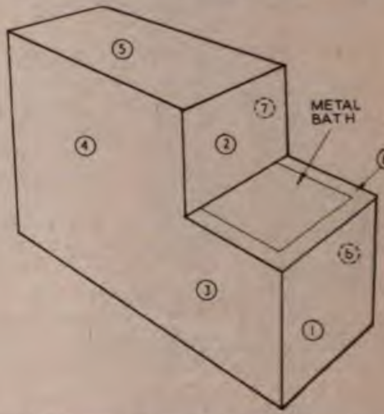

FIG. 2.—*Diagram showing positions at which temperature measurements were taken when carrying out tests on the radiation from the furnace walls.*

Radiation Tests

At this stage, tests were carried out on the radiation from the furnace walls. Fig. 2 gives details of the positions at which temperature measurements were taken with a surface pyrometer. The following table shows the results obtained.

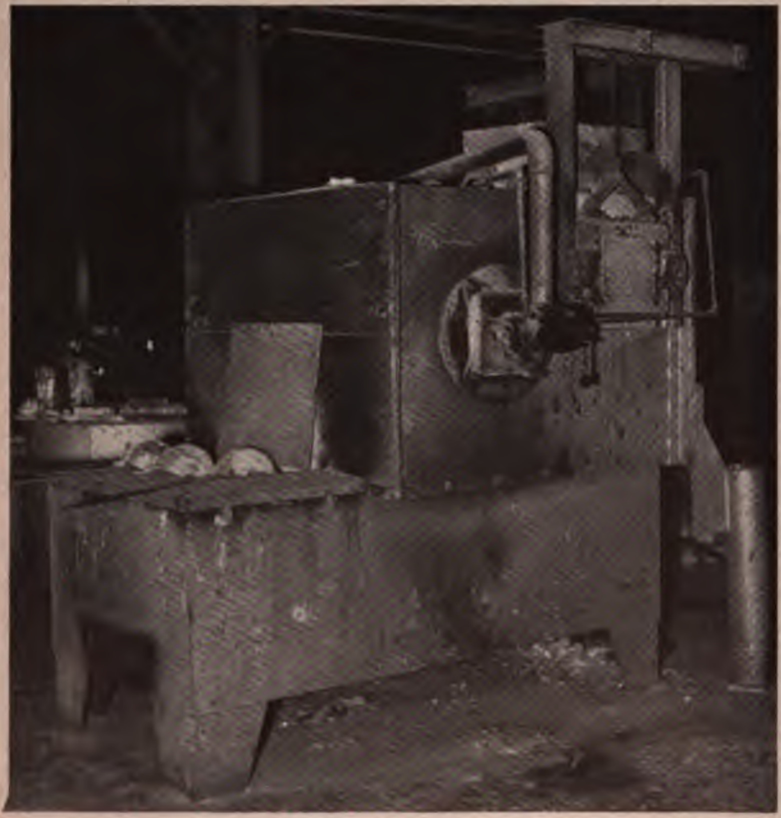

FIG. 3.—*General view of the reverberatory furnace for melting aluminium, at Kent Alloys, Limited.*

:mperature 9.5 deg. C. (49 deg. F.).

ce temperatures at points shown in Fig. 2.

Deg. C	Deg. C.
.— 30	5.— 52
.—112	6.— 35
.— 23	7.—110
.— 45	8.— 71

nspection after Six-weeks' Operation

; to pressure of work the furnace (see
was run for about 11 hr. per day, and only
out six weeks was it emptied of metal to
ı inspection of the concrete. The concrete
amp and walls were in excellent condition,
ery hard but covered with a white dust
vas probably alumina derived from oxida-
the metal. There was a slight crack
he floor of the bath and another up the
of the ramp due possibly to contraction,
ie were not very severe and probably con-
the surface of the concrete, since no metal
enetration was observed. The floor of the
ıs remarkably clean and free from metal,
ndicated that the non-wettable property of
crete could prove very important when a
turn round from one alloy to another was
l.

on of Dam, and Burner Quarl

ction of the dam showed that rather severe
ad taken place, particularly where it had
posed to flame scour, but its condition did
rant renewal at this stage. Subsequent
ons proved that the dam had a life of a
er six months, and it is now precast in a
Fondu/crushed firebrick premix and
l every six months. The burner quarl was
lent condition, and was still in very good
n after two years' service, when it was
ately broken up in mistake by workmen
; out repairs.

CONCLUSION

furnace has now been in operation over
l a half years, and the original refractory-
: bath is still in very good condition. The
pair which has been necessary is minor
; where lumps of concrete have been
l off accidentally. Working conditions
en vastly improved by the introduction of
e of furnace, and a considerable saving in
costs has been achieved. For instance,
o-and-a-half-years life of the bath is
nt to the life of 20 crucibles. In addition,
½ gall. of oil per hr. is saved, the reverbera-
nace running on 2 gall. per hr. as against
per hr. for a crucible furnace. The melt-
s achieved when the furnace is being used
e of the order of 1½ to 2 hr. for melting
of aluminium to 750 deg. C.

REFERENCES

al environment survey, by D. Turner, M.SC., PH.D.;
, M.B.E., M.SC., F.R.M.S., A.I.M.; A. Eyden, A.M.I.MECH.E.,
lwards, A.M.I.MECH.E., *Metal Industry*, May 11 and 18,

Lifting of Import Controls

A further major step in dismantling the financial and commercial controls introduced 20 years ago at the beginning of the war was announced in the House of Commons on November 4 by the President of the Board of Trade, Mr. Reginald Maudling. Most of the remaining controls on imports from the Dollar Area, western Europe, and a number of other countries were removed with effect from Monday last.

The Government states that it intends to make further progress with the relaxation of the few remaining controls as soon as it can. The treatment of imports from Japan and the Eastern Area (the USSR and other Soviet block countries) and now China is not affected by the measures announced last week.

Items hitherto restricted only from the Dollar Area and now freed from control include:—Those items of machinery not previously liberalized, electrical equipment and apparatus, including valves but not transistors, photographic and cinematographic equipment and films, oil, glass fibre and manufactures.

Other items derestricted include:—Scientific, industrial, and optical instruments, calcium carbide, worked stone and slate, diamond dies, heavy chain, wire cloth, cars and other motor vehicles, amusement machinery, cutlery, glassware not previously liberalized, clocks and parking meters, cigarette lighters, ash trays, and other similar goods.

Copies of the amendment to the Open General Licence will be on sale from HM Stationery Office, Kingsway, London.

Brymbo Steel's Development Plan

Involving capital expenditure of over £2,000,000, Brymbo Steel Works, Limited (a subsidiary of Guest, Keen & Nettlefolds, Limited), is to carry out a second development scheme. The new scheme consists of the complete replacement of the four old ingot reheating furnaces by a continuous bogie furnace and the installation of a new cogging mill, which will enable the works to take full advantage of the increased steelmaking facilities and which will roll ingots two and a half to three times as large as those at present being rolled. At the same time, bottom pouring facilities will be introduced.

A result of the changes will be an increase in the throughput of ingots as soon as the mill comes into operation. Ample steelmaking facilities to enable the increase to take place are already available.

The company's first development scheme was finished this year. It involved the modernization of the steelmaking plant.

Industrial Safety Association

Recognizing the importance of accident prevention, many of the leading manufacturers of industrial safety equipment have formed an Association—the Industrial Safety (Personal Equipment) Manufacturers' Association with the purpose of "tackling the problem from the inside." The Association intends to organize constant analysis and study of materials, design and manufacturing techniques embodied in personal equipment, and to work in close liaison with Government departments, trade unions, medical authorities, etc. for the regular exchange of up-to-date information. With the establishment of this Association, safety and welfare officers will have a ready source of information available for the settlement of their problems and enquiries relating to safety equipment. The address of the Association is 6, Holborn Viaduct, London, E.C.1.

Loughborough College Extension

Work commenced last Monday on the £2,000,000 extension programme planned for the Loughborough College of Technology. The first turf of the 44-acre site was cut by Sir Herbert Manzoni, city engineer for Birmingham and chairman of the College's buildings development sub-committee, at a short ceremony which marked the start of operations. The project, said Sir David Eccles, Minister of Education, in a message to Sir Edward Herbert, chairman of the governors of the College, was "one of the largest and most important in the Government's £160,000,000 plan for technical education."

New teaching buildings and a "student's village," laid out in streets and closes with its own village shops, will go up on the site which is surrounded by 150 acres of playing fields and open space. Some of the buildings are expected to be ready by September, 1960, and the rest by the end of 1961. When completed the College will be the largest residential technical college in this country, with accommodation for about 1,400 students in full-time and sandwich courses, and of these about 1,000 will be living on the campus.

The centre piece of the new buildings will be a six-storey science block with laboratories for the study of aeronautics, automobile engineering, and nuclear energy; a special feature will be a workshop engineering block designed as a miniature factory in which students will learn production techniques. A separate building will house the library which will have an initial stock of 50,000 books. The College Union will also have its own building with a fully-equipped theatre, a games hall of 5,000 sq. ft., a dining room, cafeteria and a buttery.

The "student's village" will be the first of its kind in Britain. About 800 of the students will live in the village in two- and three-storey terrace blocks and for post-graduates of the College there will be a new nine-storey block. The rest of the students will live in existing halls of residence and in lodgings. The architects for the teaching buildings, are Richard Sheppard, Robson & Partners and for the hostel buildings, Harry Fairhurst & Son.

New Chairman of BNFMRA Council

Mr. F. C. Braby, M.C., D.L., M.I.MECH.E. (chairman and managing director of Fredk. Braby & Company, Limited), has been elected chairman of the Council of the British Non-Ferrous Metals Research Association to succeed Dr. Maurice Cook, C.B.E., who retires from office on December 31 next. Mr. Braby, a graduate in engineering of Manchester University, is a prominent figure in the engineering and metal-manufacturing industries. A past-president of the Engineering and Allied Employers National Federation and of the London and District Engineering and Allied Employers Association, Mr. Braby has also contributed much to the managerial efficiency and technical advancement of the galvanizing industry through his service as chairman of the Hot Dip Galvanizers and the Galvanized Tank Manufacturers Associations. Mr. Braby has played an active part in the affairs of the Research Association since 1929, and has been a member of the Council since 1935. In 1950 he was appointed a vice-chairman and hon. treasurer of the Association.

PERGAMON PRESS, technical and scientific publishers, is removing from 4, Fitzroy Square, London, W.1, to *Headington Hill Hall*, Oxford.

Atomic Energy Exhibition

Dr. J. M. Whittaker, vice-chancellor of Sheffield University, opened the exhibition of the United Kingdom Atomic Energy Authority at Sheffield City Museum, on November 6. This is the first time that the exhibition, which is to go on tour, has been shown to the public. Entitled "Peaceful Uses of Atomic Energy," it includes a working model of Calder Hall, and has reproductions of the fuel elements, both metallic, and the newest type by which graphite is impregnated by enriched uranium. (Dr. Whittaker said that Sheffield University had a small type of "Zeta" and a much larger one was being built.)

A special section of the display showed Sheffield's contribution. This included steel castings, heavy rolled plate, rolling mills, stainless steels, turbine shafts, graphite and metalurgical research. It was said that orders to the value of £5,000,000 had been placed by the Authority in the Sheffield area in the last year. All the stainless steel in the fast breeder reactor at Dounray, said to be "the most complicated fabrication job in Europe," was made in Sheffield. Mr. E. H. Underwood, the Authority's director of public relations, said about the section dealing with isotopes, that in various ways the use of these isotopes was saving British industry £3,500,000 a year—and could save it £14,500,000.

German Foundrymen's Technical Association

In connection with the 50th anniversary of the *Verein Deutscher Giessereifachleute* (German Foundrymen's Technical Association), a special issue of the magazine *Giesserei* has been published. In an editorial, Dr. Schwietzke, tells of the foundation of the Association in Berlin and outlines its subsequent development until the present time when it is catering for every section of the German foundry industry. Dr. Philipp Schnieder, the secretary of the Association, has contributed a long article detailing the history of the Association—unlike the British Foundrymen's Association which started with seven founders, the German one initially had 36. Portraits of the "old-stagers" and the present officers are included. This section is followed by a series of authentic articles on 50 years of grey-iron, malleable, steel, copper-base, light-alloy and white cast-iron founding. Following these there are between 40 and 50 articles covering very completely every phase of foundry practice. The production of this special issue has been magnificently carried out, and the Editor and his staff are to be congratulated on the completely successful outcome of their work.

NU-SWIFT, LIMITED, fire-extinguisher manufacturers of Elland, Yorks, report in their latest *Newssheet* that British exports of fire extinguishers are the highest in the world, and that last year, the company's exports amounted to nearly one-third of the British total.

THE DUTCH SUBSIDIARY of G. & J. Weir, Limited, the Glasgow engineers and founders, etc., Weir N.V., has acquired the business of N.V. "Warmtekracht," Rotterdam, and has moved its headquarters to that address. N.V. "Warmtekracht" will continue its work of repairing heat exchangers and small marine diesel engines up to 2,000 h.p. and new machine shop capacity will be used for the manufacture of Weir products. The new arrangement will give wider service and repair facilities for Weir and Drysdale marine auxiliaries.

Making Plastics Patterns— Practical Working Instructions

By Michael Geraghty

Most foundries in this country have a need for a simple, quick and economical method of producing dimensionally-accurate duplicate patterns. This article describes such a method, in which is used a steel-loaded plastic* developed originally for the production of jigs, fixtures and dies, and for plumbing repair work.

When making cast-resin patterns, the surface of the material has a finish of approximately 32 micro-inches; shrinkage during hardening is negligible; thus there is no practical difference in size between the original pattern and the duplicate. Abrasion resistance material is also good; the physical properties are as follow: tensile strength—4.5 tons per sq. in.; compressive strength—8.0 tons per sq. in.; volume per pound—11.4 cub. in.; shrinkage on a 3 by 4 by 1-in. specimen—0.0005 in. per in. In addition, such material has excellent machinability and can be drilled, tapped, etc.

Step-by-step Procedure

For making duplicates, one should proceed thus :—A wood or metal loose pattern-half is laid on a board and a wooden frame is placed around the pattern and clamped in position. Surfaces of the pattern and the inside of the frame are coated with a mould release-agent. A mixture of high-grade pattern plaster is then poured in slowly until the pattern is covered.

When the plaster has set, the pattern should be removed. The plaster mould is then coated with a heat-resistant sealing lacquer. Alternatively, it is possible to eliminate the need for a coating by placing the mould in an oven at 140 deg. F. for about three hours, which eliminates entrapment of moisture on the mould surface. Because the plastic cures itself by the chemical generation of heat, any moisture present on the mould may expand and cause imperfections on the pattern surface. After sealing or drying, the mould is ready to receive the plastic material, but it should also be coated beforehand with mould release-agent to prevent any adhering to the surfaces.

Necessary Precautions

Proper preparation before pouring the material into the mould is essential. The proportions of the material for admixture with the hardener are most critical and the manufacturer's instructions should be carefully followed at each stage if success is to be assured. This point cannot be over emphasized. Average hardening time is two to three hours at room temperature, depending, of course, on the volume poured. The greater this volume, the quicker the cure. Before removal from the plaster mould, the plastic pattern may be machine-planed level with the surface of the mould.

For the production of the second half of the mould, proceed exactly as for the first half, and here some advantage may accrue from the use of dowel pins and holes. With judicious handling, the plaster mould can be used to reproduce many patterns. If the plastic material itself be used in place of plaster for the mould, many hundreds of duplicate patterns can be produced.

Matchplates can be made by cutting out the pattern outline in a plate or board, aligning the cope and drag plaster moulds on each side of the cut-out, and clamping them in place. The plastic can be poured into the cavities through a simple runner and gating system. Regardless of whether the mounting is on wood or metal, the adhesive quality of the plastic holds the pattern in place.

Desired changes in a pattern may be made beforehand by altering the plaster moulds, as desired, with modelling clay. Because plastic patterns are not affected by humidity or by low and high temperatures, they do not present any storage problems.

Powell Duffryn form New Subsidiary

Powell Duffryn, Limited, announce the formation of a new subsidiary company, Powell Duffryn Modulair, Limited, with offices at Powell Duffryn House, Berkeley Street, London, W.1. Its principal function will be the marketing of all types of heating, ventilation and air-distribution equipment, especially the Dravo heater which has hitherto been handled by Weatherfoil, Limited. This heater is manufactured in the UK by Coventry Radiator & Presswork Company, Limited, under licence from the Dravo Corporation, an American engineering concern.

The new company is also taking over from Weatherfoil, Limited, the marketing of Tuttle and Bailey equipment both in the UK and in many overseas countries.

The chairman of the new company is Mr. W. H. Sharland and it will be managed by Mr. E. B. Overton. Mr. Sharland is deputy chairman of the parent company, Powell Duffryn, Limited, and Mr. Overton was formerly a director of Weatherfoil, Limited, from which company he has resigned. He is also a director of Janitor Boilers, Limited—another Powell Duffryn Group company. Mr. Barrie Heath, managing director of Powell Duffryn Carbon Products, Limited, and Mr. R. H. Stewart, managing director of Janitor Boilers are also on the board.

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* "Plastic steel" is a Devcon product; sole concessionaires for UK and Eire: B. P. Barrus (*Concessionaires*), Limited.

DSIR Industrial Organization Reports

Amongst summaries of reports available from the lending library unit of the Department of Scientific and Industrial Research at 20, Chester Terrace, London, N.W.1, appear two of interest to founders, *viz:*—Ref. No. TIDU 6914, Plant requirements to set up and operate a grey-iron jobbing foundry—40 pages; price: Microf. 10s. Enlarged print 50s. TIDU 6935. Plant requirements to set up and operate a brass foundry—84 pages; price: Microfilm 21s.. Enlarged print, price on application.

These reports may be seen at the address quoted and may be borrowed free of charge (but each application must be made on a Science Library loan requisition form). Photocopies can be supplied at the prices stated; payments should *not* accompany orders.

The information reported has recently been made available by the technical-aids branch, International Co-operation Administration, Washington. The reports give advice on the type of plant to be installed, manufacturing operations, cost of machines and materials and on layout. Operational economics are discussed, these including topics of labour costs, overhead charges, capital requirements, credits and marketing. Mention is made of the rôle of workers training, welfare activities and of safety regulations.

Coal Board No Longer a Monopoly

"The Coal Board is no longer a monopoly"—said Mr. Paul Chambers, chairman-elect of Imperial Chemical Industries, Limited, and a part-time member of the National Coal Board, in his closing address to the Combustion Engineering Association conference at Scarborough last week—"it is the supplier of one fuel which is fighting hard with other fuels. In that fight, we have to realize that oil, gas, and—in some countries—natural gas—can flow easily through the equipment in which they are being burned. And at the other end of the chain, with coal you have a residue of ash to dispose of, whilst gas and oil leave no solid residue. If we can introduce automation into the boiler house, and into the coal-burning appliances of industry, the cost of making coal flow in the same way that oil and gas will flow can become relatively small. The user can get back to considering the cost of the fuel itself, and its advantages and disadvantages. As a member of the National Coal Board I have been heartened by the work which is being done in this field. I believe that coal is going to remain our chief economic fuel for many years to come."

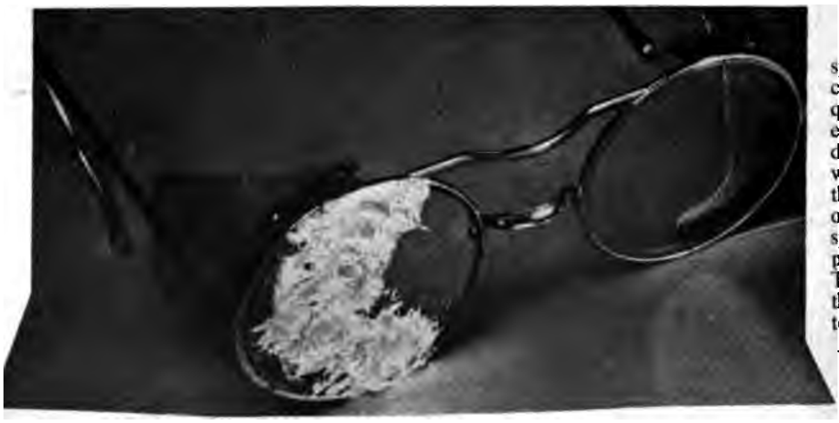
National Foundry Apprentices Competition

Forty-six candidates from foundries all over the country entered for the National Foundry Apprentice's Competition which was held on November 6 with a view to finding suitable young men to represent the British foundry industry in next year's International Foundry Competition. In general, arrangements were made for the tests to be carried out in a number of industrial centres, the organization being in the hands of local branches of the Institute of British Foundrymen.

Candidates were drawn from foundries dealing with all types of material—steel, iron, light alloys, bronze and brass. Entrants from the London area totalled seven and it is noteworthy that six of these are from firms belonging to the Association of Bronze and Brass Founders. (The interest which was aroused among Bronze and Brass Founders by the ABBF Competition which was held earlier in the year may be partly responsible for this.) The firms who have sponsored personnel for the competition are to be congratulated on their public-spiritedness in furthering the interests of youth within the industry. Results of this preliminary event are not expected to be announced before the New Year.

South Durham's New Blast-furnace

Mr. T. J. Williams, director and group general manager, South Durham Steel and Iron Company, Limited, lit a new blast-furnace on Saturday (October 31) which, with an output of more the 1,000 tons of pig-iron a day is the largest ever built for the company. The furnace, which, with its auxiliary plant has cost about £1,500,000, is at the company's North Works, West Hartlepool, and, when in full production, will more than double the pig-iron output from the works. After lighting the furnace, Mr. Williams said "It is a pointer to the way the company has developed and modernized, particularly over the past 12 years, and we are continuing still further with our new South Works, and a blast-furnace there will still be bigger." The new furnace, built by Ashmore, Benson, Pease and Company, Limited, Stockton, has a hearth diameter of 25 ft. 6 in. and when in full production is expected to yield an output of 7,500 tons of pig-iron per week, which will boost the pig-iron capacity of the North Works to between 13,000 and 14,000 tons a week.



Grim Warning*

A grim warning of the danger of splashes of molten metal and the constant necessity for wearing adequate eye-protection devices is embodied in the illustration reproduced alongside. The photograph was accompanied by the statement that the moulder wearing this pair of spectacle-type goggles was splashed with molten aluminium, presumably at about 700 deg. C. The man received slight burns on the head and hands but was able to continue his work.

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*From information supplied by Safety Products, Limited.

New Works for H. C. Hopper (Norwich), Limited

Industrial development has been started in the heart of Norwich, on a site of almost three acres bounded by Coslany Street, Colegate and the River Wensum. Part of this expansion will involve the firm of H. C. Hopper (Norwich), Limited, engineers, patternmakers and founders, and will cost £35,000. When completed, the development will change the face of Coslany Street and, if the hopes of the managing director of the firm (Mr. R. Scott) are realized, will provide work for 400 to 500 men. It was announced some months ago that H. C. Hopper (Kingston), Limited, had merged with Barnards Foundry, Limited, in Norwich, and that it was hoped to join the iron and non-ferrous foundries of both companies into two large foundries in Norwich, to be known as Barnards Foundries, Limited. It was eventually decided, however, that the two companies should become one under the name of H. C. Hopper (Norwich) Limited, Norfolk Iron Works, Coslany Street.

The move from Kingston is now completed, and some 30 skilled workers have moved to Norwich, making the number of men employed by the firm in Norwich now up to 125. At present, the patternmaking shop and machine-shop are at Salhouse Road (see Fig. 1), but when the development is complete the wood- and metal-patternshop, the machine-shop, and new and much bigger foundries for both iron and non-ferrous metals will all be together at Coslany. It is intended to enlarge the iron-foundry space considerably, and eventually to produce castings up to ten tons in weight—these castings will be machined in the same works.

Mr. R. Scott, the managing director of the new firm, was last year's president of the National Society of Master Patternmakers, and is a Council member of the South of England Founders' Association. He brings with him to Norwich a wealth of experience and many good business connections. A bright future is forecast for the engineering, patternmaking and foundry business in Norwich if it keeps up to date, so the new buildings at Coslany are being equipped with the most modern plant. Machine-tools costing £50,000 are on order, and the next step will be to train more skilled men to use them. The firm's policy is to employ young men and train them under the supervision of highly-skilled veteran workers. In this way an important contribution to employment in the city's engineering industry can be confidently expected.

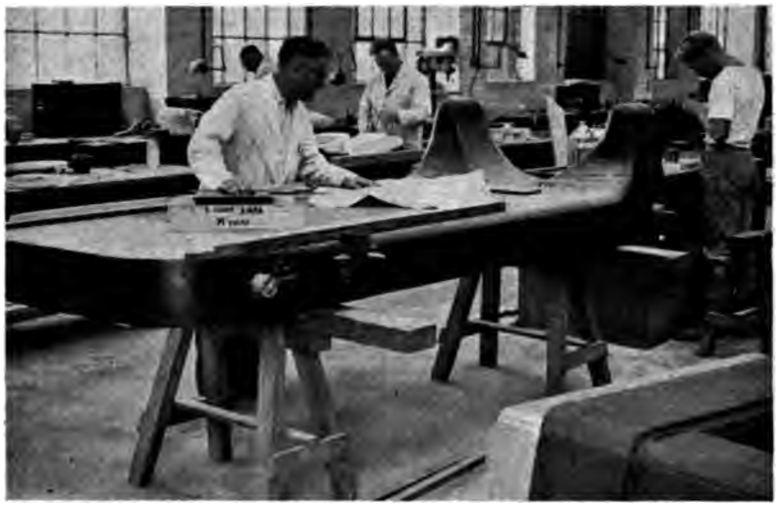

FIG. 1.—*Part of the present patternmaking shop, at Salhouse Road, of H. C. Hopper (Norwich), Limited. The item shown under construction is a pattern for part of a large machine-tool.*

(Courtesy: Eastern Evening News)

British Equipment for Russia

Equipment which will be used for drilling very hard rock faces and which represents the latest design in mobile drilling plant figures largely in the recent Russian contract awarded to Climax Rock Drill & Engineering Works, Limited, London, E.C.2, a member of the Holman Group. F. Taylor & Sons (Manchester), Limited, Salford manufacturers of leather belting and cranes, and a member of the Steel Group, shares in the contract which is worth well over £250,000. Both companies have played a leading role in the development of this type of equipment in the UK.

The machines for the Russian contract are an adaptation of the Taylor-Hurd mobile electric mining drill, the operating platform being carried on a double telescoping tower which is raised by two hydraulic rams from 6 ft. to a maximum of 19 ft. 6 in. from ground level. The machines weigh about 15 tons each and are mounted on crawler tracks.

Industrial Production Rises

Index of industrial production for September is given, provisionally, as 114-115, compared with 98 for August and 102 for July. The sharp rise, however, merely reflects the end-of-holiday seasonal influence and, when seasonally adjusted, is likely to be 112-113, compared with 113 for August and 112 for July.

There would appear to be an increase of 7 per cent. on September, 1958, and of 3 per cent. on September, 1957. In the third quarter as a whole production was 2 per cent. above the previous three months and 7 per cent. higher than in the corresponding period last year.

In the second quarter wages and salaries rose by 4 per cent. compared with the second quarter of 1958, and for similar comparable periods gross trading profits of companies were up by 15 per cent. and gross profits plus other trading incomes rose by 9 per cent.

Capital investment rose by 4 per cent.—5 per cent. in the private sector (£519,000,000) and 3 per cent. in the public sector (£359,000,000).

Personal

Mr. William M. Grainger and Mr. David D. Carrington have been appointed to the board of Walter Somers, Limited.

Mr. H. C. Clements has resigned as director and executive of W. Canning & Company, Limited, owing to continuing ill-health.

Mr. R. E. Carr has resigned from the board of John Dale, Limited. He is to be invited to become the first president of the company.

Mr. Ralph Carr has been appointed managing director of Alston Foundry Company, Limited, steelfounders, Alston, Cumberland.

Mr. N. E. Crump, president of the Canadian Pacific Railway Company, has been elected a director of the International Nickel Company, Limited.

Mr. T. W. Heather, assistant managing director of the General Electric Company, Limited, has retired. He was a member of the board for over 21 years.

Mr. Herbert Slack, formerly technical sales manager, has been appointed to the board of Kelvin & Hughes (Industrial), Limited, as sales director.

The address of the new secretary of the International Committee of Foundry Technical Associations, Dr. P. W. Müller is Post-box HB2815 Walchestrasse 27, Zurich 23, Switzerland.

Colonel C. G. Lancaster has become managing director of Plowright Bros. Limited, engineers, Chesterfield and London, a subsidiary of the Bestwood Company, of which he is chairman and managing director.

Mr. F. W. Nield (technical development manager), Mr. D. Epstein (chief chemist) and Mr. Michael Danischewsky (works superintendent) have been elected to the board of F. & M. Supplies, Limited.

Mr. James Fraser, an area plant inspector with Balfour, Beatty & Company, Limited, engineers, was killed on October 29 when his van was in collision with a lorry on the Great North Road between Dunkeld and Pitlochry.

Mr. M. Stupfler, assistant managing director of the *Centre Technique des Industries de la Fonderie*, has been made a Chevalier of the Legion of Honour; the recommendation was made by the Minister of Industry and Commerce.

Mr. Ronald R. Taylor, managing director of Robert Taylor & Company (Ironfounders), Limited, Muirhall Foundry, Larbert, has been appointed by the Secretary of State for Scotland as a member of the Glenrothes Development Corporation.

Mr. Bernard W. Dawkins, joint managing director of Bennis Combustion Company, Limited, mechanical-stoker manufacturers, Walkden, Manchester, has been appointed vice-chairman, and Mr. T. M. Dickson has joined the board as managing director.

Mr. Harry Eeles has been appointed a director of development at the British Institute of Management, with the primary responsibility of developing the Institute's relations with the larger industrial and commercial concerns throughout the country.

Mr. E. M. Cleland, of Bairds & Scottish Steel, Limited, has been appointed president of the Glasgow Commercial Exchange. Mr. J. L. Thomson, area *marketing manager* of the central area of the Scottish *Divisional Coal Board*, has been elected vice-president.

Mr. Michael Parkinson has been elected a vice-*chairman* of Crompton Parkinson, Limited, and Mr. J. B. Scott has been elected a director. Mr. E. C. Holroyde has resigned as a vice-chairman and director at his own request in order to allow for the appointment of younger men.

Lord Adams of Ennerdale, o.b.e., who began his working life as an iron-ore worker and subsequently became full-time secretary of the Cumberland branch of the Winding Enginemen's Union, will retire this month from the secretaryship of the Cumberland Development Council, an appointment he has held for 22 years.

Mr. Allen L. Stock, due to his recent appointment as chairman of the Morgan Crucible Company, Limited, finds he is unable to continue to carry out the full duties of chairman of Lodge Plugs, Limited, and will, therefore, relinquish his position as chairman and resign from the board of Lodge Plugs at the next board meeting on November 17.

Mr. John Hunt, a director of R. Hostombe, Limited, ferro-alloys, 2, Regent Street, Sheffield, left by air for Japan on October 31. He is to have talks with the Tokio firm with whom Hostombe's have an arrangement for the import of 70,000 tons of chrome-ore yearly from the Philippines, and the export of aluminous raw materials to Japan from South Africa.

Mr. Frank Perkins has been elected chairman of Ambrose Shardlow & Company, Limited, the Sheffield crankshaft manufacturers, and Mr. J. C. Proudfoot has been appointed managing director following the death of Mr. T. P. N. Burness. Mr. Perkins, founder and chairman of F. Perkins, Limited, the Peterborough diesel-engine company, and a director of Massey-Ferguson Holdings, Limited, became a director of Ambrose Shardlow early this year. He is also chairman of Lawes Chemical Company, Limited.

Mr. A. P. H. Aitken has been appointed deputy chairman of Textile Machinery Makers, Limited, and will have overall responsibility to the Stone-Platt Industries board, of which he is a member, as divisional director for companies of the Stone-Platt Group in Lancashire and Yorkshire concerned with the manufacture and sale of textile machinery. Mr. Aitken is succeeded as managing director of Textile Machinery Makers by Mr. G. Hardman. Mr. F. G. Hawkings is appointed to the board as commercial director.

Mr. Thomas G. Ellison and Mr. Arthur E. Skan have been appointed joint managing directors of George Ellison, Limited, manufacturers of electric switchgear and motor-control gear, Birmingham. Mr. Thomas G. Ellison is a son of the founder of the company, the late Mr. George Ellison, and has been a director since 1929. He was elected chairman of this and of the associated companies Alfred Ellison, Limited, and Tufnol, Limited, in 1955. Mr. Arthur E. Skan has been a director of all three companies since 1944 and is managing director of Tufnol, Limited.

Mr. John Harrison has been appointed managing director of Atlas Copco (Great Britain) Limited, in place of Mr. J. C. Greig, who has resigned. Mr. Harrison was apprenticed to the Ashington Coal Company in 1931 and stayed with this company until 1942, gaining his first-class colliery manager's certificate during that period. After nationalization of the coal industry he was appointed an area production manager of the NCB, and served in this capacity for five years, joining Atlas Copco in 1953. In 1957 he was transferred to the New Zealand associate company as managing director, returning to Britain—in the capacity of deputy managing director of Atlas Copco (Great Britain)—in June, 1959.

British and World Shipbuilding

Lloyd's Register Returns for September Quarter

Steamships and motorships under construction at the end of September totalled 292 ships of 2,097,764 tons gross, an increase of 64,019 tons as compared with the previous quarter, according to Lloyd's Register shipbuilding returns relating to merchant ships of 100 tons gross and upwards. The total comprises 92 ships of 553,331 tons fitting out afloat, and 200 of 1,544,433 tons still to be launched.

Apart from the June quarter, the total now under construction is the lowest since June, 1957. Some 63 ships of 313,183 tons were commenced, 61 ships of 289,571 tons were launched and 51 ships of 250,894 tons were completed. The vessels under construction included 50 steamships of 1,025,127 tons, and 242 motor ships of 1,072,637 tons. In other Commonwealth countries there were under construction 10 steamships of 104,290 tons and 44 motor ships of 115,458 tons.

Oil tankers building in Great Britain and Northern Ireland totalled 64 ships of 1,024,890 tons, which is 29,202 tons more than in the June quarter, and represents 48.9 per cent. of the total tonnage under construction in this country. Construction in hand in the principal districts of Great Britain and Northern Ireland is indicated in Table 1.

TABLE 1.—*Shipbuilding Construction in Hand in the Principal Districts of Great Britain and Northern Ireland.*

District.	September 30, 1959.		June 30. 1959.		September 30, 1958.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen	17	19,512	17	24,361	16	31,206
Barrow ..	2	67,500	2	67,500	3	94,500
Belfast	14	289,100	15	293,953	17	305,740
Bristol ..	2	3,844	1	3,500	3	6,200
Clyde:						
Glasgow ..	48	484,677	46	452,914	68	529,475
Greenock ..	23	160,620	23	143,520	30	178,260
Dundee.. ..	6	32,128	6	40,514	5	40,300
Hartlepool ..	3	25,710	3	25,710	6	44,840
Hull	43	15,621	38	12.461	37	17,182
Leith	9	40,826	8	32,326	11	57,350
Liverpool ..	13	130,857	12	111,638	13	124,719
Middlesbrough	9	137,632	11	171,953	15	187,679
Newcastle-upon-Tyne	33	391,476	34	408,183	40	414,334
Southampton ..	9	10,839	7	11,064	8	3,469
Sunderland ..	30	270,201	24	215,489	27	240,056

The sizes of steamships and motorships under construction in Great Britain and Northern Ireland included the following:—100 to 500 tons, steam nil (103 motorships); 500 to 1,000 tons, steam 3 (14); 1,000 to 2,000 tons, steam nil (12); 2,000 to 4,000 tons, steam 3 (12); 4,000 to 6,000 tons, steam 1 (7); 6,000 to 8,000 tons, steam 1 (21); 8,000 to 10,000 tons, steam 3 (28); 10,000 to 15,000 tons, steam 9 (40); 15,000 to 20,000 tons, steam 2 (4); 20,000 to 25,000 tons, steam 8 (1); 25,000 to 30,000 tons, steam 6 (nil); 30,000 to 40,000 tons, steam 10 (nil); 40,000 and above, steam 4 (nil).

Apart from the Communist countries, there were under construction in the world 1,463 steamships and motorships of 9,813,557 tons, of which 21.4 per cent. were being built in Great Britain and Northern Ireland. The present total is 74,521 tons more than last quarter.

British Trade Fairs Overseas

Originally formed by the Federation of British Industries to organize the British trade fair in Baghdad in 1954, British Overseas Fairs, Limited, is to have a wider basis of operation and organization to equip it for the increasingly important task of organizing British trade fairs overseas. The British Exhibition in New York next June—its present main task—will be the biggest and most important display of British industry's consumer and engineering products ever to be shown overseas. Further projects in other parts of the world are under consideration.

Among arrangements which have been approved by the Board of Trade are the appointment of new directors, advice on overseas fairs by a new export promotion policy committee, new capital, and a top level executive committee for the New York exhibition.

The board of BOF which has consisted of Sir Norman Kipping (chairman), director-general of FBI, Mr. W. P. N. Edwards (managing director), Sir Leslie Gamage, chairman and managing director of General Electric Company, Limited, chairman of Pirelli General Cable Works, Limited, and a member of the board of many companies associated with electrical engineering and manufacturing, Lt.-Col. Lord Dudley Gordon, chairman of Hadfields, Limited, and Millspaugh, Limited, and a director of Manganese Steel Company, Limited, and other companies, and Mr. P. F. D. Tennant, overseas director of the FBI, is to be strengthened by the addition of Mr. Frank Bower, president of the Association of British Chambers of Commerce, and Mr. M. D. Oliphant, president of the National Union of Manufacturers.

To assist BOF in the New York exhibition, the following executive committee has been set up:—Lord Rootes, chairman of the Dollar Exports Council, chairman and member of the boards of many companies in the motor-car manufacturing field; Mr. W. H. McFadzean, president of the FBI, chairman and managing director of British Insulated Callender's Cables, Limited, and associated and subsidiary companies, and chairman of British Copper Refiners, Limited; Sir Hugh Stephenson, Consul General in New York; Mr. Peter Garran, Commercial Minister, British Embassy, Washington; Sir Norman Kipping; Sir Francis Evans, BOF liaison officer for supporting programmes, and a director of Dewrance & Company, Limited, makers of boiler mountings, etc., of London, S.E.1; Sir Alexander Brackenridge, chairman of the Exhibition Liaison Committee in New York, and Mr. W. P. N. Edwards.

BVMA Election of Officers

The British Valve Manufacturers' Association announce that Mr. F. Burgess (White-Nunan, Limited) has been elected chairman of the Association for the year 1959/60, and Mr. J. W. Plowman (Dewrance & Company, Limited) has been elected vice-chairman. The other members of the executive committee for the year 1959/60 are : Mr. D. Bailey, Sir W. H. Bailey & Company, Limited ; Mr. F. T. Bintcliffe, J. Blakeborough & Sons, Limited ; Mr. D. S. Birkett, Samuel Birkett, Limited ; Mr. G. F. Chambers, Bryan Donkin Company, Limited ; Mr. F. S. Ham, Ham, Baker & Company, Limited ; Mr. H. R. Hammond, Crane, Limited ; Mr. K. M. Leach, Audley Engineering Company, Limited ; Mr. N. P. Newman, Newman, Hender & Company, Limited ; Mr. T. B. Pattison, Alley & MacLellan, Limited ; Mr. A. Robertson, Glenfield & Kennedy, Limited, and Mr. A. L. Trump, Saunders Valve Company, Limited.

IBF National Works Visits Day in Pictures

The pictures reproduced below and on the facing page were all taken during the National Works Visits Day function of the Institute of British Foundrymen, held on October 30. This was the date when, as reported in last week's issue, 230 foundrymen from all parts of the United Kingdom "descended" on the Metropolitan area for a series of visits to foundries—to eight works in all. The party visits were organized this year by the London branch of the Institute, as was the dinner held on

FIG. 1.—*Group of visitors from the IBF in the works of Le Grand Western Foundries, Limited, at Southall, Middlesex.*

FIG. 2.—*Section of the* 160 *or more foundrymen assembled at the National Works Visits Day dinner, held in Lyon's Corner House, Tottenham Court Road.* Shown standing, at the top table, are (left to right):—Mr. R. B. Templeton (IBF past-president); Mr. C. H. Wilson (IBF president); Mr. L. A. S. Harbourne (compère); Mr. J. Bain, A.M.I.MECH.E. (branch president—and chairman at the dinner); Mr. E. S. Renshaw (Ford Motor Company, Limited); Mr. D. A. Richards (IBF junior vice-president); Mr. G. Skript (Langley Alloys, Limited); Mr. J. Blakiston, M.I.MECH.E. (IBF past-president); Mr. R. N. Stallard (G. D. Peters & Company, Limited), and Mr. R. S. Goodfellow (R. & A. Main, Limited).

FIG. 3.—*The IBF national president, Mr. C. H. Wilson (left) and national secretary, Mr. G. Lambert (right) at the luncheon following the visit to British Bath Company, Limited, at Greenford. The third member of the party is Mr. G. R. Webster, director of the host firm.*

the same evening at a West End restaurant. Luncheon and tea were taken at or near the various works, and on these occasions the foundrymen visitors were the guests of the firms concerned. (Details of the foundries visited were recorded in the issues of the JOURNAL for October 22 and 29.)

In addition to the top table guests mentioned in the caption to Fig. 2, the following were also guests of the branch at the dinner—Mr. H. S. Williams (of Langley Alloys, Limited), Mr. A. Talbot (of Le Grand Western Foundries, Limited), Mr. A. F. Masters (of Broom & Wade, Limited) and Mr. G. R. Webster (of British Bath Company, Limited). Mr. H. W. Keeble, who was to have represented K. & L. Steelfounders and Engineers, Limited, was prevented at the last moment from attending, but sent an apology and good wishes. Since the event, numerous letters received by the Institute and the host firms have testified to the great and practical worth of this series of visits.

FIG. 4.—*Informal group photographed before the dinner party: from left to right, Mr. G. I. Duffin (Sheepbridge Alloy Castings, Limited); Mr. S. C. Marlow (British Industrial Sand, Limited); Mr. L. Brown (Premo Pattern Company, Limited); Mr. F. Collins (Ex-Cell-O Corporation (Machine Tools), Limited), and Mr. E. C. Rowen (Pattern Equipment Company (Leicester), Limited).*

FIG. 5.—*Part of the group of 30 IBF members with their hosts (Mr. Dick Broom, Mr. C. Broom Smith, Mr. H. T. B. Evans, Mr. Tozer and Mr. Wood) at lunch in the Fitzroy Club, Marlow, during the whole-day visit to Broom & Wade, Limited, High Wycombe.*

Notes from the Branches

Northampton Section

Works Visit to Alumasc, Limited

In October, 41 members of the Northampton and district section of the Institute of British Foundrymen visited the works of Alumasc, Limited*, of Burton Latimer, to see their low-pressure aluminium-die-casting plant. The party was received by Mr. E. C. Lewis, managing director, who explained some of the difficulties in making aluminium castings and the advantages to be gained by his process.

This works has developed rapidly since the war, and now employs 400 people to produce 65 tons per week of aluminium castings and finished units composed mainly of beer barrels, rainwater goods and holloware, while lesser quantities of a very wide range of castings are also made, such as carburettor bodies, chairs, switch-boxes, clock cases and lampholders.

Metal is melted in five Sklenar reverberatory furnaces and charged in the liquid state to 350-lb. capacity electric induction furnaces over which are mounted the dies. A pressure of between 2 and 10 lb. per sq. in. is imposed on the liquid metal to fill the die, after which pressure is cut off and the castings removed from the die with only a runner of about 2 oz. to be removed, even on castings which weigh up to 85lb. The visitors, who were nearly all from iron foundries, were amazed at this yield, but it is one of the factors which indicates the advantage Mr. Lewis and his team have obtained in deciding upon low-pressure die-casting for general work.

Products and Progress

Alumasc are the largest makers of aluminium beer-barrels in the country and make a range of five sizes. The barrels are cast in two halves and welded together, coated inside and turned out as a completed product; together with special dispensing taps, pressure-reducing valves and a beer-cooling unit, they offer a complete service which has fulfilled a big demand from leading brewers. A rectangular cask has now been produced to minimize wasted lorry and shipping space by allowing closer packing of the load.

Much development work of a very specialized nature has been, and is still being, carried out by the company. A nose cone which offered considerable problems in production has been supplied for a ground-to-air projectile and a further very complicated casting produced for the "Seaslug." General Motors Corporation sought the help of Alumasc to develop the manufacture of an aluminium crankcase which is made in two halves and bolted together. Thousands of these engine castings are now produced per week in Messins, USA, under licence from Alumasc. They are used for the 2.4 litre power unit of the new Chevrolet Corvair car which is one of the new American so-called small cars announced quite recently. While the name Alumasc was comparatively unknown in the foundry industry until recently, the fact that General Motors sought their help over the development of this aluminium crankcase is indicative of the reputation which this company is now obtaining for itself all over the world.

The castings seen were of very good appearance and dimensional accuracy, and it was said that this pressure process could almost eliminate troubles from porosity without having to bother about feeders at all.

Mr. J. R. Palmer (foundry manager), Mr. F. W. Grapes (engineering manager), and Mr. S. J. V. Rumble, the production engineer, acted as guides and after a tour of the works, refreshments were served in the excellent canteen building where Mr Lewis was asked a number of questions ranging from the importance of the mould coatings used to dress the dies, to die reconditioning and composition of the variety of alloys melted.

This was an evening visit which was very instructive and proved an "eye opener" for everyone. In the words of Mr. J. T. Stevens, who proposed the vote of thanks to the directors, "To-night I feel like the boy who saw a giraffe for the first time, and declared there is no such animal, castings like these are quite beyond my experience but they are all the more interesting for that." Mr. Lewis replied on behalf of his staff.

Building Exhibition

Lord John Hope, the Minister of Works, will be present at Olympia on November 18 to officially open this year's Building Exhibition, which is to last until December 2. There will be more exhibitors than ever before—including displays from Africa, Australia, Belgium, Canada, Denmark, Germany, Portugal and Spain. A prominent feature will be various new methods of insulation introduced since the Thermal Insulation (Industrial Buildings) Act of 1957. Stands of particular interest to foundrymen are briefly reviewed below (the figures in brackets being the stand numbers).

Allied Ironfounders, Limited (*211-212 Row N, 227-228 Row O, National Hall*), will include in their exhibit the new Agamatic oil-fired boilers, solid-fuel boilers, convector fires, and room heaters. New cookers will also be shown, and baths and basins in suitable settings will be installed on the first floor of the stand.

Griffin & George (Laboratory Construction), Limited (*629, National Hall Gallery*), will display for the first time the Griffin-Grundy all-metal laboratory furniture, which has improved corrosion resistance, completely rigid construction, and no projecting handles on cupboards and doors.

Hattersley Brothers, Limited (*232, Row P*), will be displaying their solid-fuel appliances, and gas-fired boilers for domestic central heating and hot-water supply, one of the boilers having an output of 75,000 B.T.U.'s per hr.

Walker Crosweller & Company, Limited (*706, First Floor*). Two new thermostatic valves will be on show, and a new economy tap, the Mezurtap, which dispenses exactly one pint of water in about 45 sec. and yet leaves both hands free to wash.

Newton Chambers & Company, Limited (*205-206*). Two of the latest Redfyre domestic heating appliances will be displayed: the Centramatic 50, which is fully automatic and made specifically to standard kitchen-equipment height, and the No. 5 Bacboiler, which is designed to provide a simple installation for domestic hot water and/or radiators.

Thomas Robinson & Son, Limited (*W378/V379, Empire Hall*). Eighteen woodworking machines will be exhibited, including seven entirely new types. The new machines are: a circular-saw bench (Type YA/T), a 7- by 3-in. moulder (Type ED/T) and five machines of the new Cadet range. Also on show will be improved models of the 48-in. Band Re-saw (Type XF/T) and the Pan-L-Saw (Type EU/T).

United Steel Structural Company, Limited (*P236, National Hall*). Several models of football grandstands with steel frames of cantilever design will be on show, and the two-storey stand will be an exhibit in itself, being also of cantilever construction.

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* *A detailed description of this foundry is to appear in the Journal shortly.*

News in Brief

ARRANGEMENTS have been made between Associated Electrical Industries, Limited, and Alco Products Inc., New York, for joint collaboration in the design, manufacture, and sale of diesel-electric locomotives for world markets.

THE NAME OF A.C.V. Sales, Limited, the selling organization for A.E.C., Limited, Crossley Motors, Limited, and the Maudslay Company, Limited, has been changed to A.E.C. (Sales), Limited. The management will continue unchanged.

SANDHOLME IRON COMPANY, LIMITED, Todmorden, has placed an order with Chatwood and Chantry of Sheffield for a heat-treatment furnace, measuring 16 by 12 by 8 ft., which is to be used for the stress relieving of large cast machine-tool components.

A DEVELOPMENT certificate has been granted to the English Electric Company, Limited, Stafford, by the Board of Trade for extensions to shops making high-precision electrical control equipment. The extensions may involve up to £1,000,000.

Mr. PHILIP DORTE, O.B.E., Midlands controller of Associated Television, Limited, was the guest speaker to the Non-Ferrous Club at the Queen's Hotel, Birmingham last week. A collection, taken during the meeting, on behalf of the Earl Haig Fund yielded £18 2s.

ORDERS FROM companies in Iran, worth nearly £300,000, for the supply of 115 truck chassis have recently been received by Leyland Motors, Limited. During the past ten months, the Leyland group has received contracts worth over £1,500,000 from this country.

THE NAME of Synthetic Carbon & Engineering Company, Limited, Stanmore (Middx), has been changed to Morgan Components, Limited, in order to make clear the association between the Morgan Crucible Company, Limited, and Synthetic Carbon & Engineering Company.

THE 62ND ANNIVERSARY of the establishment of the *Syndicat General des Fondeurs de France* was celebrated on October 22 at a general meeting presided over by Mr. Maurice Olivier. The occasion also celebrated the receipt by the organization of the National Order of the Legion of Honour.

IN HIS REPORT to the Employment Committee this month (November), Mr. J. Corbett, Oldbury employment officer, states that the unemployment figure is at the record low level of 0.6 per cent. Industry in the town is thriving so much that employers are having to recruit labour from other areas.

THE INDIAN GOVERNMENT has announced the procedure for regulating export of manganese-ore during the period September 1959-October 1960. Established shippers, mine-owner exporters and the State Trading Corporation will be given an allotment of quota for a quantity equal to the quota issued to them in 1958-59.

AFTER 21 MEN had been declared redundant, 140 maintenance men at the foundry of Sterling Metals, Limited, at Nuneaton walked out during the afternoon of November 4. The management claim that these men had to be discharged following the completion of certain reorganization. Some 2,000 men are employed in these engineering works.

AEROX, LIMITED, Lister Place, Hillington, Glasgow, S.W.2, announce that as a result of the steadily increasing demand for aeration, filtration, and fluidizing equipment, they have outgrown their premises at Crawley and have now acquired a much larger factory for their engineering section, located at Chalford, Stroud, in Gloucestershire.

LAST MONDAY the three-man delegation of the Scientific Instrument Manufacturers' Association of Great Britain (SIMA) left London Airport for Moscow. The delegation consists of Mr. F. Hamill of Hilger & Watts, Limited, Mr. H. D. Binyon of the Solartron Electronic Group, Limited, and Mr. K. A. Macdonald of Unicam Instruments, Limited.

BRITISH RAILWAYS (MIDLAND REGION) have placed a contract, valued at more than £40,000, with R. H. Neal & Company, Limited, of Grantham, for special three-ton mobile cranes which are to be used in the railway modernization programme. They are designed to operate within the British Railways Grampus wagons, and for unloading concrete railway sleepers.

"CONSIDERABLE IMPROVEMENT" in the trade of the port of the Tees during September was reported by the chairman, Lt.-Col. T. Eustace Smith, at the monthly meeting of the Tees Conservancy Commission. Revenue for 11 months was only £6,400 short of last year's total, with a month to go. Iron-ore imports were up by 100,000 tons, petrol by 19,000 tons, and oil by 29,000 tons.

THE Norsk Hydro's plant at Herøya in Telemark produced 9,300 *tonnes* of magnesium from Norwegian dolomite in 1958, an increase of 300 *tonnes* over the output in 1957. Almost all of the output was exported. According to an official in the Ministry of Industry, the demand for magnesium that led to the construction of the metal plant at Herøya has so far been less than expected.

CONTRACTS FOR 2,500 diesel engines valued at £500,000 have been completed with major European combine harvester manufacturers by the industrial engines department of the Ford Motor Company, Limited. They are the industrialized versions of the company's four-cylinder and six-cylinder engines as used in Thamas Trades trucks which develop 62 b.h.p. and 96 b.h.p., respectively.

A SPECIAL DINNER for long-serving employees of W. H. Allen, Sons & Company, Limited, mechanical, hydraulic, and electrical engineers, of Bedford, on November 4 was attended by 45 men and women with, in the case of the men, 45 years' service, and in the case of the women, 40 years' service. Altogether the company has recently presented 415 gifts to employees with 25 or more years' service.

THE DIESEL-ELECTRIC propulsion machinery for the new 4,000-ton cable ship being built for Cable & Wireless, Limited, has been ordered from the English Electric Company, Limited, by the builders, Cammell Laird & Company (Shipbuilders & Engineers), Limited, Birkenhead. Valued at nearly £250,000, the contract includes propulsion motors, switchgear, control gear, and motors driving the auxiliary machinery. The work is being carried out by the company's marine projects division.

INCREASED ACTIVITY in the foundry department at the Holwell Ironworks at Asfordby Hill, Melton Mowbray, Leicestershire, has led to more men being taken on and there are still vacancies. Only three months ago the firm announced that they would be closing down another blast furnace and might have to discharge about 150 workers. Eventually, however, by transferring men within the Stanton Organization, the company had to discharge only 11 men. It is hoped that there will now be further expansion of activities.

BRITISH RAILWAYS' WORKSHOPS are to build another 390 diesel-train vehicles which the British Transport

News in Brief

Commission have ordered for passenger services in London, Liverpool, Manchester, Leicester, Nottingham, Hull, North Wales, and Scotland. The orders are worth nearly £6,000,000. The railway workshops at Swindon will build 51 of the vehicles, Eastleigh Works (Hants) will build 57, and the other 282 will be constructed by the carriage works at Derby. All these vehicles will be in service within the next two years.

The 1,000th diesel railcar to be built at the British Railways Carriage and Wagon Works at Derby was launched by Mr. A. E. Bates, works manager, at a ceremony on November 4. After the ceremony, the car carried 40 works employees on a 60-mile outing. The car, the 414th to be produced at the works in aluminium alloy—the others are of steel—has now gone into regular service between Chester and New Brighton. Under the railways' modernization scheme, 4,600 diesel railcars are planned, and of these 3,000 are already operating.

General Sir Reginald Kerr, general manager of British Waterways, stressed the advantages to industrialists of sending goods to the ports by way of inland waterways when he spoke at the opening of the Waterworks Exhibition in Birmingham on November 3. In referring to the facilities offered to manufacturers, Sir Reginald said that the Waterways had introduced a container of four tons capacity for bulk cargo, which could be loaded straight into barges from despatch bays at canalside premises. The exhibition, the first of its kind to be staged by British Waterways, was opened by the Lord Mayor of Birmingham, Alderman John Lewis.

Rubery Owen, Limited, Darlaston, are introducing a new scheme "Project 59" designed to develop the initiative of young employees between the ages of 17 and 20. Each employee will be sent away for a week or a month to study a subject of his own choice, and although he will have to undertake this study out of his own resources, his normal wages will be paid to him during his absence. On return to work, each youth will present a report on activities, and the management will consider the result of the study period. In charge of the scheme is the Rubery Owen education officer, Mr. M. S. Milliken, who describes it as an experiment in character training.

Mr. A. McTurk Cooke, chairman and managing director of William Cooke & Sons (Sheffield), Limited, steelfounders, told employees at their annual dinner on November 7, "The welfare relationship has now become a most vital part in the firm's successes." He added that it was increasingly recognized that happy relationships were a vital part of the country's industries and happy employees contributed a great deal to the success of industry. He presented a cheque to Mr. J. W. Birkinshaw in recognition of his 50 years' service with the company (Mr. Birkinshaw is still at work). Mr. Cooke also presented a silver cup to Mr. Alfred Pearson the work's champion angler.

A saving of £30,000,000 per annum in foreign currency is expected to eventually result from a 10-year plan, now being drawn up by South African Board of Trade officials, which will enable local factories to manufacture motor-car parts for building into imported vehicles at the country's eight major assembly plants. The programme will call on the assembly plants to incorporate initially some 25 per cent. of locally-produced parts in vehicles; the proportion to be increased as more specialized components become available. It is estimated that within 10 years local industry will be manufacturing between 90 and 95 per cent. of all car parts. The new industry will supply spare parts as well as components for new vehicles.

At the annual meeting on October 28 of the Birmingham area committee of the National Union of Manufacturers, Mr. Grahame W. Donovan, chairman of the Midland Council of the NUM, warned that the Government might introduce compulsory measures if firms failed to respond to inducements to site industry in areas with high unemployment. He said that a senior official of the Board of Trade had made it plain that the Government might have to take stringent steps if industry insisted on "piling into" the already dense industrial areas. The guest speaker at the luncheon following the meeting was Mr. P. J. Feeney, a member of the Birmingham Stock Exchange, who illustrated how stock exchanges could help the small and medium-sized companies. Details were also announced of a conference to be held in Birmingham to-day (Thursday), in co-operation with the Midland Region of the Federation of British Industries. The principal speaker will be the new President of the Board of Trade, Mr. Reginald Maudling, and the subject will be the European Free Trade Area.

Mr. Leonard Cleaver, Conservative M.P. for Yardley (Birmingham), at the annual dinner of the British Bronze and Brass Ingot Manufacturers' Association in London last Saturday said : Bronze is an ancient metal with an historic past and the bronze and brass industry has served the country well for many years. But times change and we are now living in the Sputnik world which challenges the complacency of the past. This is a time when new alloys are required and when new uses must be found for the older types of metal. This naturally involves two things. First, there must be co-operation between supplier and customer in finding new markets for the products of the industry. At the same time, considerable sums must be spent on research without which the industry might wither and die. The free trade area (large or small) presents a challenge to the ingot manufacturers and it is, therefore, essential that the industry should be properly represented and have the appropriate information to present at the vital time to Government Departments. (Mr. Cleaver was previously a partner in Heathcote & Coleman, the firm which acts as the secretariat for the BBBIMA and other foundry associations.)

Largest arc-melting furnace in Britain has been ordered from Birlec-Efco (Melting), Limited, Birmingham, by the English Steel Corporation, Limited, Sheffield, for use in connection with its scheme for casting in vacuum ingots for forging. With a diameter of 21 ft., the furnace will have a nominal charge capacity of 80 tons. It will be engaged on melting and refining high-grade carbon, alloy, and stainless steels. To be rated at 20,000 kvA., the furnace will be supplied with an AEI transformer equipped with "on-load" tap-changing equipment of the resistor bridging type, arranged for remote electrical control. Cold steel scrap will be used in the furnace, which will be top charged from an overhead bucket suspended by crane. Removable sides plates will be fitted to the frame of the furnace casing, enabling local lining repairs to be effected. A robust frame will support the electrode-raising and roof-swing gear on a chassis entirely independent of the furnace shell. The roof ring will be lifted by a lever system when raising and swinging the roof. The furnace shell will be tilted hydraulically, allowing a forward tilt of 45 deg. for pouring and a backward tilt of 15 deg. for slagging.

Long-service Record

The illustration shows (left) 77-year-old MR. ERNIE CHAPMAN, of Port Clarence, County Durham, who has created a record for long service with the Anderston Foundry Company, Limited, Port Clarence, having served the company for 63 years. "Chappie," as he is known to his workmates, started as a 14-year-old working a 70-hr. week for a few shillings. Over the years, he became foreman dresser, from which position he retired last August. On Friday, October 30, his workmates gathered at the Royal Hotel, Port Clarence, to pay tribute to him, and he was presented with a chiming clock by MR. D. HOLMES, foundry manager (right), on behalf of his colleagues.

Hepworth & Grandage Changes

Hepworth & Grandage, Limited, of Bradford and Yeadon, Yorkshire, founders and manufacturers of the Hepolite engine-components and gas-turbine blades, announce several senior staff changes intended to strengthen the company's position on the production side of their operation. Mr. T. L. Booth, previously director and general manager of Hepworth & Grandage (Yeadon) Limited, has been appointed to the board of the Hepworth & Grandage, Limited, parent company and will take up responsibility at their main St. John's factory at Bradford for jig and tool drawing office, planning, work-study, tool-room and machine-tool repair departments. Mr. Booth joined Hepworth & Grandage, Limited, in February, 1951, having already had a very wide experience in all branches of engineering. He has been notably successful in building up production of gas-turbine blades at the Yeadon factory, and his new appointment will reinforce the parent company's position at Bradford. Mr. Booth remains on the board of Hepworth & Grandage (Yeadon) Limited.

Mr. H. Forest, director and works general manager of the Hepworth & Grandage main factory at Bradford, has been appointed to the board of Hepworth & Grandage (Yeadon) Limited, and the general managership of the Yeadon factory, previously the responsibility of Mr. Booth, will now be taken over by Mr. A. Rowntree, who will be assisted by Mr. E. Boyes. Both Mr. Rowntree and Mr. Boyes began their careers at the Bradford factory and were later transferred to Yeadon.

IVE Competitions

The Institute of Vitreous Enamellers have announced their Whittle Foundation Competition. This competition is primarily intended for junior staff in the enamelling industry, *i.e.*, of 30 years of age or under. However, where a competitor has been away on National Service, or away from the industry on war service of any kind, and this is stated in a covering letter, the time of such service will be subtracted from his actual age and taken into consideration by the assessors. The papers for the competition should be from 3,000 to 5,000 words with any necessary illustrations and must, of course, be written entirely by the competitor, although any experimental work done by others can be referred to with due acknowledgment. Care must be taken to see that any information given in the paper is not confidential, and competitors are advised to submit their papers to their company for approval before sending them in for consideration. The subject can be of the entrant's own choice, but the following title is suggested for the present competition: "The Future of the Institute in the Enamelling Industry." The Whittle prize will be in the form of a medal, and will carry with it a further prize of a visit to a Continental enamelling plant. Competitors for the A. Biddulph award, which is made for the best critical assessment for the Annual School, held from October 9 to 11, are reminded that the closing date for entries is December 1.

BSCRA Council Elections

Dr. Robert Hunter, deputy managing director of the Clyde Alloy Steel Company, Limited, was recently elected chairman of the Council of the British Steel Castings Research Association. Mr. W. S. Scott, a director of Darlington Forge, Limited, has succeeded Dr. Hunter as vice-chairman of the Council.

The retirement of Mr. C. H. Kain, managing director of Lake & Elliot, Limited, and the National Steel Foundry (1914), Limited, who was chairman of the Council for over five years, was marked by the presentation, by the Association's staff, of a stainless-steel gavel, designed and made at the BISRA research station. This gavel comprises a scale model of a hand-shank, the anvil being formed of an etched section of a clover-leaf test-piece—an acknowledgement of Mr. Kain's invention of this design of test-piece. A tribute to the work of the retiring chairman was paid by Dr. A. H. Sully, director of research, BSCRA, who said that the erection of the research station and the expansion now in progress would be a lasting testimony to Mr. Kain's chairmanship.

Record-breaking Foundryman

As will be known from the national Press, 23-year-old Marine Peter Degnan R.M.F.V.R., a Territorial who lives at Tooting Bec, London, S.W.17, carried out a 110-mile march in 36 hours 17 minutes from Poole, Dorset to Charing Cross where he arrived last Saturday night. This achievement beat a previous record held by an American army officer. It is of interest to note that marine Degnan is a foundryman employed by the Eyre Smelting Company, Limited, at their Tandem Works, Merton Abbey, London, where he works in the continuous-casting bronze shop. So long as there are young men of this stamp in the country, there can surely be nothing wrong with the youth of Britain and all founders will join in offering heartiest congratulations on this magnificent achievement.

Company News

Westinghouse Brake & Signal Company, Limited—The company has acquired for cash all the share capital of Heatly & Gresham, Limited, engineers' agents, of London, S.W.1.

E. Boydell & Company, Limited, manufacturers of loaders, dumpers, and shunters, etc., of Manchester—All the company's capital has been acquired by Winget, Limited, the Rochester (Kent) manufacturers of contractors' plant, etc., for £630,000 cash.

Charles Roberts & Company, Limited, manufacturers of rail and road vehicles, wheels, axles, and springs, etc., of Horbury Junction, near Wakefield (Yorks)—The directors deny rumours of plans for hiving-off the company's hire-purchase interests.

Robert Hudson, Limited, light railway-equipment manufacturers, etc., of Leeds—Final dividend of 8¼ per cent. makes 16¼ (15) per cent. for the year ended June 30, 1959. Group net profits declined to £279,660 (£311,054) after tax of £219,500 (£314,500).

Neepsend Steel & Tool Corporation, Limited—The depression of the late autumn of last year and early spring of this year has now receded, says the president, Sir Stuart Goodwin. Practically all the company's firms are on full time with prospects of being exceedingly busy for a period ahead.

Tube Investments, Limited—The dividend is being raised to 20 (17½) per cent. on the increased £16,805,974 capital for the year to July 31, 1959, with a final of 12½ (10) per cent. Group trading profits advanced to £16,782,643 (£16,104,804), and after tax of £6,152,202 (£7,032,394), the net profit is up at £6,458,460 (£6,003,420).

Cannon Holdings, Limited, manufacturers of domestic gas appliances and chemical plant, etc., of Bilston (Staffs)—A final dividend of 15 per cent. makes a 20 (15) per cent. total for the year ended June 30, 1959. Group trading profits rose to £142,476 (£88,456), and after tax of £78,841 (£55,865), the net profit is £63,635 (£32,591).

Sidney Flavel & Company, Limited, manufacturers of gas appliances, of Leamington Spa (Warwickshire)—The 7½ per cent. dividend is doubled for the year to July 31, 1959. No payment was made for 1956-57. Consolidated trading profits rose to £311,016 (£242,809), tax absorbs £101,415 (£89,893), and the net profit is £84,468 (£54,820).

International Nickel Company of Canada, Limited—The company is maintaining the fourth-quarter dividend at 65 cents, which, with an extra year-end dividend of 40 cents, makes a total of $3 for 1959. Both are payable on December 21. This compares with $2.60 last year, when the payment had been reduced from $3.75. Net earnings in 1958 were $39,700,000, against $86,100,000, and were equal to $2.71 ($5.90) per common stock.

Birmid Industries, Limited, manufacturers of components for motor-car engines, iron, steel, and light alloy castings, etc., of Smethwick (Staffs)—As well as raising the dividend from 17½ per cent. to 20 per cent. for the year ended July 31, 1959, the directors propose to pay an interim next May provided earnings remain satisfactory. Group profits rose to £2,129,465 (£1,953,080), tax takes £1,051,527 (£963,349), and the net profit is £1,077,938 (£989,731).

Herbert Morris, Limited, manufacturers of lifting and transporting machinery, of Loughborough (Leics)—The company announces a one-for-one scrip issue to *holders registered* November 10. The 25 per cent., tax free, distribution is maintained for the year ended July 31, 1959, on capital increased through the acquisition of British Monorail, Limited. The final dividend is 15 per cent. and the bonus is 5 per cent. Group profit decreased to £842,951 (£1,099,205), and tax of £409,943 (£557,180) leaves £437,653 (£554,926).

H. J. Baldwin & Company, Limited, manufacturers of cable covers and electrical components, of Nottingham—Group turnover of the company, which is now controlled by Hartley Baird, Limited, has recently shown a growth towards a level much in excess of any previous year, states the chairman, Mr. H. J. D. L. Walmsley. He believes this will further increase and should result in a marked improvement in group profitability, but it is emphasized that this will not apply to the first five months or so of the current year.

Crompton Parkinson, Limited, manufacturing electrical engineers, of Guiseley (Yorks)—It is proposed to capitalize £1,451,506 in a one-for-four scrip issue to holders of December 15. The issue does not imply any further change in the total amount to be distributed by way of ordinary dividends. Total dividend is being raised to 14 (12) per cent. for the year ended June 30, 1959, with an increased final of 9 per cent. Group profit rose to £2,755,691 (£2,687,577), and after tax of £1,442,096 (£1,527,380), the net profit is £1,253,021 (£1,112,429).

Final dividend of **Samuel Osborn & Company, Limited**, steel and tool makers, etc., of Sheffield, is raised from 12½ per cent. to 20 per cent., making a total of 27½ per cent. for the year ended July 31, 1959, against 20 per cent. previously. Subject to audit, the group manufacturing and trading profit contracted from £1,275,680 to £1,093,947, the balance being struck after charging £387,521 (£401,933) for depreciation, directors' remuneration, etc., which includes a provision of £54,116 (£49,484) against possible loss of investment in an overseas subsidiary. Net profit of £535,360 compares with £661,639, and after minority interests, the net balance is £130,297 lower at £527,738.

Metal Closures/John Dale

Offer by Metal Closures, Limited, West Bromwich (Staffs), for the ordinary and fully-paid 6 per cent. convertible unsecured loan stock of John Dale, Limited, makers of non-ferrous collapsible tubes, aluminium and light-alloy castings, etc., of London, N.11, has been accepted by holders of more than 94 per cent. of the ordinary and 99 per cent. of the loan stock and therefore becomes unconditional.

The offer by Philip Hill Higginson Erlanger, Limited, to purchase for cash the ordinary shares and loan stock of John Dale has also become unconditional. It is expected that allotment letters in respect of the new Metal Closures ordinary shares will be posted on November 14 and that dealings will start on November 16. As foreshadowed in the merger proposals both companies have declared interim dividends of 11 per cent. to holders at November 4. Metal Closures has also foreshadowed a final of 11 per cent.

Mr. R. E. Carr has resigned from the board of John Dale and is to become the company's first president. Mr. L. R. Carr, chairman, Mr. P. J. A. Lachelin, deputy chairman, and Mr. W. E. H. Jones, managing director, have joined the board of Metal Closures and Mr. Carr has been appointed its deputy chairman. The chairman of Metal Closures, Mr. K. D. Erskine, the managing director, Mr. W. R. Gamble, and Mr. S. E. Clotworthy, have joined the board of John Dale.

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Raw Material Markets

Iron and Steel

The demand for pig-iron continues to increase, and present deliveries in all grades are higher than they have been for some time past. The chief call is for the low-phosphorus irons to meet the needs of the engineering and speciality foundries, which maintain a high level of outputs of high-duty castings for many trades. Of these foundries those catering for the motor vehicle trade are very busy. Many other users of high-quality castings are also specifying for appreciable quantities, these including heavy engineering, power and electrical plant manufacturers, the agricultural machinery trade, and the steelworks. The machine-tool trade is also calling for increased quantities of castings, but not to the extent of previous levels, and from collieries and railways demands remain moderate.

These foundries have, until recently, been able to obtain without difficulty the pig-irons they require to implement the work on hand and also to provide an adequate working stock. In the low-phosphorus irons, however, some brands are now more difficult to obtain, as the heavier demand has liquidated stocks at both the foundries and the furnaces and production is fully absorbed by the orders on hand. There is a bigger demand for hematite pig-iron, and refined iron makers are also busier.

Producers of the high-phosphorus pig-irons have been able to dispose of larger tonnages recently on account of the improved demands from the light-casting trade, together with the consignments they have shipped to buyers overseas. Supplies of this grade of pig-iron are still plentiful from current outputs and fairly appreciable tonnages are held in stock by the furnaces. Some of the light foundries maintain the larger outputs, but there is still plenty of room for improvement, while the textile foundries continue only moderately employed. Deliveries of basic pig-iron, which have been stepped up recently to the steelworks, are coming forward in adequate quantities both for consumption and stock requirements.

The foundries are able to cover for their requirements of scrap. Arisings are sufficient to satisfy present needs, although demands are strong for the best quality cast-iron scrap. Foundry coke deliveries are satisfactory. All requirements of ganister, limestone, and firebricks are met promptly.

The call for steel semis from the re-rollers continues to expand and home steelworks have difficulty in fulfilling all the demands made upon them, particularly those calling for early delivery. Most of the steelworks are fully booked for their outputs until at least the end of the year. The re-rollers are able to maintain good outputs for all of their products, and there is a brisk demand for small bars and light sections, while the call for reinforcing rods is heavy. All arisings of suitable re-rolling defectives and crops are taken up quickly.

Non-ferrous Metals

The US copper situation has now reached the position where something ridiculous may well happen to the price structure. Either it will go through the roof or, like the custom smelters, become unquoted, compelling thereby potential consumers to find metal where they can at fantastic prices. Indeed, there are still no signs of a settlement and the strike has now encompassed the White Pine Copper Company, while, to add fuel to the consumers' fire, an explosion at *American Metal Climax* last week will mean the loss of a further 1,000 tons a week for up to two months. The present position is that actual supplies are now very hard to find, whereas before they could be had at around 40 cents a pound.

As mentioned above, there is no custom smelter quotation and following the fabricators' move of raising the prices of their products to a basis of 33 cents a pound, Anaconda has actually made the move and raised its quotation by 1½ cents to 33 cents a pound. Other producers are still quoting 31½ cents a pound, but they are expected to bring their prices in line with Anaconda. Yet, with little or no metal available, the price structure is meaningless.

The Chilean copper industry is again at work, but a short-lived dispute by the timbermen at Mufulira on the Copperbelt last week shows that racial disturbances on the Copperbelt are *sub-rosa* rather than dead. Disturbances in the Belgian Congo continue to mar the horizon. London, however, is a very viable market. Demand is good and is coming in from all quarters of the globe. The price has followed a hesitant course, but the trend is still upwards and with the present strike position remaining the outlook is for further gains to be recorded. At the close of business on Monday, in fact, the cash quotation was, at £265 a ton, the highest closing level so far this year. The price since then has appreciated further. The return to work of the US steelman by virtue of the US Supreme Court upholding the court injunction is taken as a bullish point, while closer to home the rapid dwindling of stocks available in LME warehouses is exerting a powerful pressure on consumers. Last week stocks fell by as much as 1,050 tons, leaving the total available at the end of last week at 6,807 tons.

Tin has been a brisk market in London, with the price held reasonably steady by sales from the buffer stock. In fact, on Friday the turnover in tin reached 840 tons, one of the highest figures recorded for several years. On Tuesday, the cash quotation moved up £4 to £798 10s., a price which was held yesterday (Wednesday). Evidence of the buffer stock manager at work is seen in the fall in stocks in LME warehouses last week by 91 tons, leaving a total of 7,580 tons available. In the US the market is flat and it remains to be seen how quickly it will pick up following the resumption of work in the steel industry. The US price is shaky at fractionally above $1.01 a pound.

Zinc has been a relatively quiet market in London, mainly due to the easing of nearby supplies. The price of cash metal, however, has been firm this week. In the US the market is featureless owing to the steel strike, and the attempt to raise the quotation last week failed, so that suppliers are now quoting 12¼ cents a pound.

Lead came into prominence last week and with supplies scarcer than they have been for many a month the price went ahead to around £74 a ton. There has been a fall of about £2 this week, however. Unless the supply position becomes much tighter the outlook would still seem for the price to sink back gracefully to around its former floor level of £70 a ton.

To MEET THE DEMAND for oil-fired boilers for homes, due partly to the requirements of the Clean Air Act, Newton, Chambers & Company, Limited, near Sheffield, are to build a workshop 200-ft. long by 50-ft. wide, for the assembling, packing and despatch of boilers at their Thorncliffe works. Provision will be made for a later extension to deal with the increased demand which is anticipated for this type of equipment. Further news from this company is that employees saved a total of £11,615 during the month of October—over £1,000 more than in the same month last year.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

November 11, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 4s. 6d.; Birmingham, £30 1s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £[illegible] 5s. 6d., delivered Birmingham, £28 10s. 6d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £35 4s. 6d.; South Zone, £35 9s. 6d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £36 4s. 6d.; South Zone, £36 9s. 6d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £28 14s. 6d.; Scotland (Scotch iron), Zone 1, £25 9s. 6d.; Sheffield, £34 2s. 6d.; Birmingham, £36 9s. 6d.; Wales (Welsh iron), £34 14s. 6d.

Basic Pig-iron.—£29 3s. 6d. delivered Staffs, Derbyshire, Notts, Lancs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £60 9s. 6d. to £62 14s. 6d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 9s. 6d. to £57 14s. 6d., scale 15s. 6d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. C, £250 0s. 0d.; 38-40 per cent., commercially carbon-free, £285 0s. 0d.

Ferro-tungsten.—80/85 per cent., 16s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 0d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent. C,* 1s. 9d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £36 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £[illegible] 4s. 6d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates (N.-E. Coast), £42 3s. 6d.; boiler plates (N.-E. Coast), £44 13s. 0d.; floor plates (N.-E. Coast), £[illegible] 11s. 6d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

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ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

945 MANUFACTURE OF STEEL IN THE ARC FURNACE. Colin, J. *L'Aciérie Electrique*, 1957 (Cahiers du Cessid) (2). Pt. 4. 1-86. (£14.) A comprehensive review of steelmaking in arc furnaces is presented. The general principles are first reviewed and then considered in detail. Charging is first discussed and the importance of the preparation of the change and its compaction are explained. Melting and dephosphorization are next described and the influence of Mn is stressed. Deoxidation, the formation of inclusions, gas evolution and desulphurization are discussed. Steelmaking in basic and acid furnaces is reviewed. Refractory linings for arc furnaces are considered. The organization of an electric steelmaking plant is discussed. (Abstract *JISI*, 1968, Oct., p. 213c.)

1402 CONSTRUCTION AND OPERATION OF A STATIC FREQUENCY TREBLER FOR HEATING AND MELTING METAL. Seulen, G. W. *Z. Metallk.*, 1959, May, pp. 299-306. (£4.) Use of mains and medium frequency for electric heating—frequency conversion—construction and operation of static frequency multipliers—industrial applications. (Author's summary.)

1450 TREATMENT OF SPENT PICKLING SOLUTIONS AND WASTE WATERS IN THE IRON AND STEEL INDUSTRY USING ION-EXCHANGE MEMBRANES. Quitmann, H. *Draht*, 1959, May, pp. 225-229. (£4 5s.) The development of an electrolytic membrane cell for the recovery of H_2SO_4 and conversion of iron salts to hydroxide sludge is described. Complete purification is secured with a conventional exchange-process tower plant for effluent treatment. Costs are indicated. (Abstract preprinted from *JISI*.)

1459 METHOD OF EVALUATION AND SOURCES OF ERROR IN QUANTITATIVE PHOTOELECTRIC SPECTRAL ANALYSIS. Diebel, H. *Arch. Eisenhüt.*, 1958 (5), pp. 275-281. (£5 5s.) Measurement and evaluation in photoelectric spectral analysis. Consideration of the weakening of the internal standard line in high-alloy metals (I.S. element correction). Approximation method. Method of determining the I.S. element correction. Measurement of the standard element content in the zero position (reflected beam). Conduct of the analysis. Third partner effect in vaporization, excitation and optical separation. Multiplicative and additive errors. Incidental errors due to optical and electronic causes. Automation of plotting and evaluation. (Author's summary.)

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1477 HYDRODYNAMICS OF MOLTEN STEEL AT TEEMING OR TAPPING. II Koike, Y. *Tetsu to Hagane*, 1958, Mar., pp. 260-262. (Abstr. *JISI*, 1959, Aug., p. 389c.)

1478 EVALUATION OF THE USEFUL LIVES OF COLD ROLLS. Funke P., sen., and P. Funke, Jun. *Stahl u. Eisen*, 1959, Oct. 1 pp. 1412-1419.

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HB 4713 CHANGE OF GRAPHITE IN CAST IRON WHEN SATURATED WITH MAGNESIUM. *Tavadze*, F. N., and M. A. Essen *Lit. Proizv.*, 1959, June, pp. 15-18.

HB 4651 INCLUSIONS (BLACK SPOTS) IN
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HB 4666 PATTERNS OF OXIDE SKINS ON LIQ
S. *Giesserei*, 1959, Vol. 44, No. 24

HB 4735 EFFECT OF ALUMINIUM, SILICON
PRIMARY STRUCTURE OF LOW-CARBO
O. D., and A. P. Pronov. *Izv. Ak*
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HB 4469 ELECTROLYTIC POLISHING OF MICR
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PRACTICAL USE OF VACUUM FURNACE .
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to which enquiries for the following
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1957, June, No. 6, pp. 1-4. ($6.35.)

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Düsseldorf, 1956. Preprint No. 12

BSCRA 908 PRODUCTION PLANNING IN THE
E. A. *Giesserei-Praxis*, 1957, Vol.
201.

Symbols for sources of tran

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Services, Department of Commerce
D.C., USA. SLA: SLA Translation
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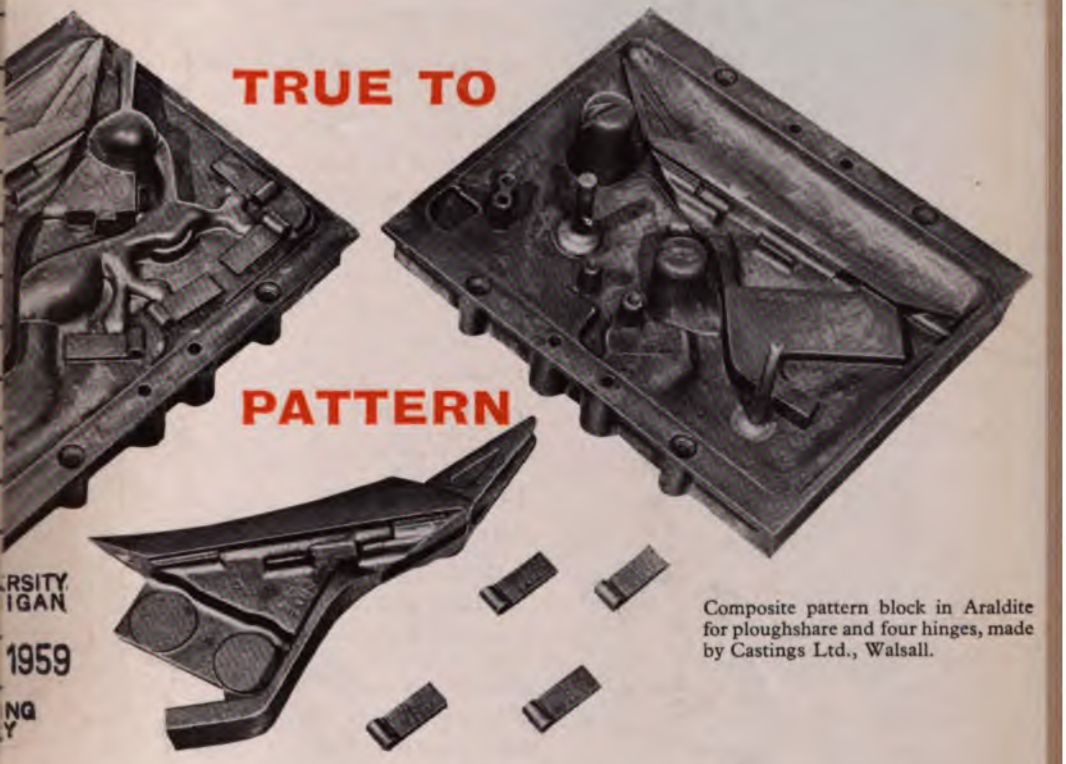

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Northern Area)
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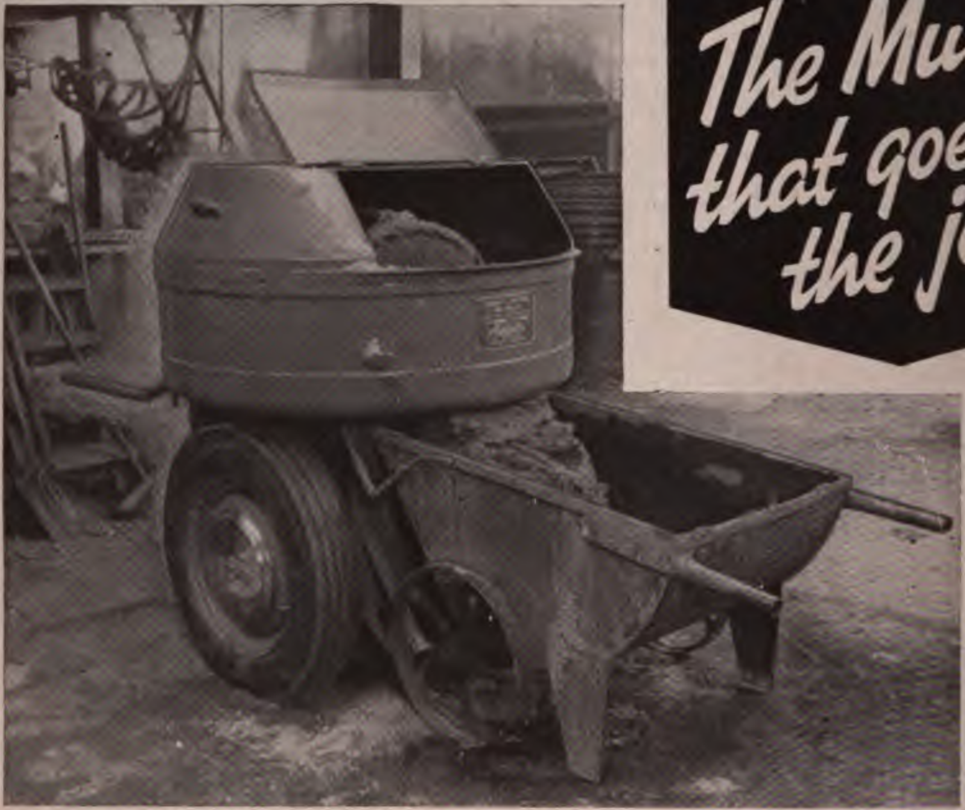

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Exporting to the Middle East

Frankly, because of political disturbances, the Middle East has made no great appeal in recent years to exporters, yet as Mr. F. J. Erroll, M.P., Minister of State, Board of Trade, pointed out at a Press Conference recently, the market—especially that associated with oil-exporting countries—is fundamentally sound. This soundness is due to the fact that the revenue from oil is this year about £500 million, and practically the whole will be spent outside the producing countries. Traditionally, the Middle East is a British market and the *lingua franca* for that market is English. Our goods are well known and highly appreciated.

It is useful to bear in mind that there has been in existence for a few years an Advisory Council on Middle East Trade, of which Mr. Erroll is chairman and Mr. H. G. Nelson (managing director of the English Electric Company, Limited) is vice-chairman. To draw attention to the importance of the market, the Council has now issued a 16-page booklet,* which briefly runs through particulars of the 16 countries comprising this area. Together, in 1958, they took goods to the value of nearly £200 million from this country and amongst these—though not detailed—there must have been a substantial amount originating in the foundry industry. This year, for example, two large firms with foundry interests have announced the receipt of really important orders from the Middle East.

It is alike natural and advisable for the principals of firms desiring to do business in the area to visit prospective buyers and—during the coffee session—" haggle " over prices. Then without reference to headquarters, they can clinch the deal on the spot. Unfortunately, for the smaller concerns, this is not possible and Mr. Erroll's advice at the Press conference was the appointment of merchants familiar with the markets to act for them. The Board of Trade can usefully be consulted when searching for such agencies. Finally, it seems wise, in view of the inroads made into this market by West Germany and Japan, to " soft-pedal " the political upsets and play up to the notion that £500 million can buy a tremendous amount of capital and consumer goods and services, no matter who controls the purse strings.

---

* **Exporting to the Middle East, obtainable free of charge from Room 0348, Board of Trade, Horse Guards Avenue, Whitehall, London, S.W.1**

Apprentices' Prize Distribution

A total of over 400, mainly consisting of parents and other relatives, gathered in the canteen of F. H. Lloyd & Company, Limited, on the evening of November 10 for the annual prize distribution to the apprentices of the Lloyd group of steel foundries, *i.e.*, F. H. Lloyd & Company, Limited, Lloyd's (Burton), Limited, and Parker Foundry (1929), Limited. From the dais, Mr. D. B. Beynon, labour manager, first welcomed the guests who, besides parents, included representatives of local education authorities and some large firms in the neighbourhood. It was extremely gratifying, he said—in these days when one hears so much about lack of parental interest—to see how many of the apprentices' fathers and mothers had in fact turned up that evening in support of their offspring. Then followed the training officer's report presented by Mr. E. J. Whitehouse. He said that ten years ago, a total of £37 value had been awarded in prizes and over the period since so great had been the increase in the number of apprentices and their success that the value of prizes on show this year was ten times that amount, a total of 149 apprentices receiving such awards. The awards themselves were of two types—a monetary gift for diligence and success in the company's own training scheme (here, a total of £1,200 was distributed) and a prize of quite substantial nature (electric drills, brief-cases, sets of tools, instruments, etc., at the recipient's choice) for success in external activities, *e.g.*, technical college, City & Guilds and other examinations, as well as some for sporting activity. In addition, certificates of apprenticeship were awarded to 17 young men who had completed their five-year period and apprentice agreements were handed over to 27 from the three foundries who had recently been accepted into employment. Mr. M. C. Lloyd, assistant managing director of F. H. Lloyd & Company, Limited, after a brief address, presented certificates and prizes to the candidates from the Wednesbury firm, Mr. W. R. Cooper, works director, Lloyd's (Burton), Limited, handed over those for the Burton employees, and Mr. R. A. Duff, works director, Parker Foundry (1929), Limited, those for the Derby personnel. The presentations, a total of 180 in all, took considerable time; the proceedings were fully reminiscent of college prize-distributions, each recipient being applauded from the hall as he walked to the dais and shook hands with the donor.

Following the presentations, the thanks of the apprentices were voiced by one of their number, Mr. Bernard Corrigan, who said how much appreciated it was that the firms had the interest of their young people so much at heart and showed it in such practical fashion. Before the visitors left, refreshments were served and if they wished, parties conducted by apprentices or staff were taken to visit the areas of the works where the various apprentices did their daily job.

The whole proceedings were an object-lesson in employer/employee relations. The serious bearing of the young men gave the impression that they had chosen a career with a worthwhile firm in a basic industry, their parents saw how well their training was looked after and Mr. Lloyd's words that the highest executive jobs in the firm were open to ex-apprentices must have stirred many to new ambitions.

CONCERNS DESIRING to have particulars of Pakistan's forthcoming requirements for sluice gates, valves, and the like, should write to the Board of Trade, Export Services Branch, Lacon House, Theobalds Road, London, W.C.1, quoting Reference Nos. ESB/26794/59 and ESB/26695/59ICA.

Forthcoming Events

NOVEMBER 23

Institution of Production Engineers

Manchester branch: "Diploma in Technology," by Dr. C. W. Whitworth, 7.15 p.m., in the Reynold's Hall, Manchester College of Science and Technology, Sackville Street.

NOVEMBER 24

National Society of Master Patternmakers

Visit to the Production Engineering Research Association, Melton Mowbray, preceded by luncheon at the Bell Hotel, 12 for 12.30 p.m.

Institute of British Foundrymen

Slough section: "My Hungarian Tour," by A. R. Parkes, 7.30 p.m., in the Lecture Theatre, High Duty Alloys, Limited.

Institute of Fuel

Scottish section: "The Turbo Furnace," by G. Williams, 7 p.m., at the Royal College of Science and Technology, Glasgow.

NOVEMBER 25

Institution of Production Engineers

Worcester branch: "High Cost of Low Overheads," by C. H. Starr, 7.30 p.m., at the Star Hotel, Worcester.

Institute of British Foundrymen

Birmingham branch: "Pattern Flow Moulding at Soho and Tame Bridge Foundries," by A. J. Shore, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

NOVEMBER 26

Institute of Welding

South London branch: "Welding and the Draughtsman," by H. B. Merriman, 7 for 7.30 p.m., at 54, Princes Gate, London, S.W.7.

Institute of Metals

Birmingham local section: A Metallurgical Cocktail, by Marcus A. Wheeler, 6.30 p.m., at the College of Technology, Gosta Green, Birmingham.

Southampton Metallurgical Society

"Hydrogen in Steel," by J. Hewitt, 7.15 p.m., in the Engineering Block, Southampton University.

NOVEMBER 27

Institute of British Foundrymen

Falkirk section: "Business Administration," by J. Liddel, 7.30 p.m., at the Temperance Cafe, Lint Riggs.
Coventry section: Annual dinner/dance, 7 p.m., at the Hotel Leofric.

Manchester Association of Engineers

"Craft of Needle Making," by H. J. Parramore, 6.45 p.m., at the Engineers' Club, Albert Square, Manchester.

Institution of Plant Engineers

Birmingham branch: "Instrumentation in Industry with particular reference to Control of Temperature, Pressure Flow, Weight, etc.," by L. F. Cohen, 7.30 p.m., at the Imperial Hotel, Temple Street.

Latest Foundry Statistics

Steel Castings: Covering September, the October *Bulletin* issued jointly by the Iron and Steel Board and the British Iron and Steel Federation, reflects the improvement in trading conditions. Employment in steel foundries increased from 17,230 in August to 17,350 in September, whilst the average weekly production of steel castings rose from 3,900 to 5,100 tons, both figures being estimated. There is still much leeway to make up before the figure for the 1958 production is reached.

Copper-base Castings: The figures contained in the November *Bulletin* of the British Bureau of Non-Ferrous Metal Statistics show a welcome upsurge in the output of copper-base castings for September, when production reached 6,481 tons. The average monthly output for the first nine months of this year was just under 6,000 tons, the overall total being 53,959 tons.

Stereophotomicrographs—Production and Viewing

By J. Ferdinand Kayser, F.I.M., Assoc.Met.*

It is an acknowledged fact that the use of the microscope has paved the way to many important discoveries. Up to the present day, however, the majority of research workers have been content with monocular viewing of two-dimensional flat photomicrographs, to such an extent that some of them do not appear to have appreciated that they live in a three-dimensional world. This article is intended to show the high standards of viewing that may be achieved with the correct training.

The first microscope was made about 350 years ago and before the end of the 19th Century high-power microscopes were generally available and microscopy had its own special literature. Even to-day Carpenter's *The Microscope and its Revelations*, the first edition of which appeared in 1856 and the eighth and last in 1901, is well worth reading and many of the photomicrographs with which it is illustrated would be a credit to a microscopist working with a good modern microscope.

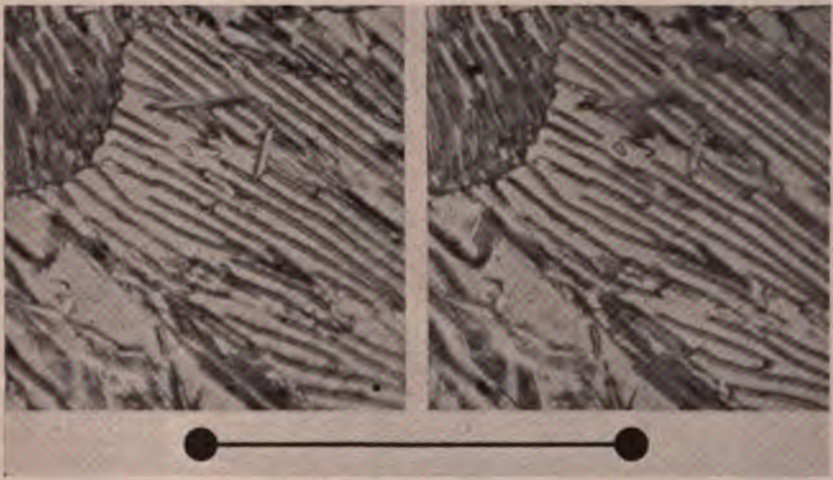

FIG. 1 (*left*).—*A flat photomicrograph which is difficult to interpret when standing alone. When viewed as a stereopair with the right-hand photomicrograph, however, a three-dimensional illustration is obtained. (See paragraphs at the end of this article for viewing instructions for this stereopair, and others which are given later.)*

Advantages of Stereophotomicrographs

Up to now few research workers have appreciated that, helpful as is a monocular microscope, a stereoscopic microscope is often far more revealing. Only a trained metallographer is able to interpret a flat photomicrograph like Fig. 1 (left), but the structure becomes quite clear when the two pictures are viewed as a steropair in three dimensions. Similarly, it is difficult to learn much about the shape of sand particles from flat photomicrographs, but stereophotomicrographs are truly realistic, and from them we may indeed make measurements of particle height, as well as of length and breadth. Many contributions made to the Institute of British Foundrymen in the past have dealt with the properties of moulding sands and sand moulds, but few of them have been illustrated with photomicrographs; most of the photomicrographs that have been published have left much to be desired. Even Davies[1] makes little use of them, and those in his book give little if any idea of the real shape of sand grains—not one of them shows the surface of a mould, a subject to which a whole chapter is devoted. The reason for this dearth of helpful photographs is probably that flat (two-dimensional) photomicrographs have been found to be inadequate, and authors have preferred to rely upon still more inadequate diagrams.

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* Mr. Kayser's portrait and biographical notes were given on page 120 of the January 29 issue of the JOURNAL. He is on the staff of Gillette Industries, *Limited*.

Uses of Stereophotography

The art of stereophotography commenced with the birth of photography, and in some fields it is used extensively. Sixty years ago Carl Zeiss produced a remarkable stereopair; using an equatorial telescope he photographed the moon in April 1896 and again in February 1900 and the two photographs, which are a perfect stereopair, have been used by A. W. Judge as a frontispiece for his book[2]. To-day, Zeiss-Aerotopograph, of Munich, manufacture a stereoplanigraph, for constructing maps from aerial photographs, that weighs 30 cwt. and costs about £15,000.

Stereophotomicroscopy in Research

Stereophotomicroscopy as a research tool is not generally used by metallurgical laboratories (although considerable use is made of low-power stereo-binocular microscopes, few of them are adapted for the necessary photography). It is probable, however, that these "binoculars" are chosen not because they give a stereoscopic view, but because it is more comfortable for trainees to use both eyes, and because they give a view of the object the right way up. The reason that stereophotomicrography is not used in research to the extent that might be expected from its extraordinary efficiency may to some extent be due to ignorance of its usefulness, but is probably due still more to its apparent difficulty of operation. There is, however, no justification for this, because stereophotomicrographs may be produced with a single-objective microscope as easily as normal flat photomicrographs. Furthermore, if the individual reproductions are not more than about 55 mm. wide, most people can learn to view them in three dimensions without the aid of a stereoscope.

Anaglyphs

A limited number of books on solid geometry, natural history and navigation have used anaglyphs for illustration purposes, but as they are in two colours (red and green) they are expensive to produce, and can only be viewed through a pair of spectacles with one green and one red eye-glass. The writer hence proposes to consider only stereophotomicrographs produced originally as black and white stereo pairs, which may be reproduced from half-tone blocks.

Proper Use of the Microscope

Stereoscopic photomicrography is a specialized branch of photomicrography, and the proper use of the microscope requires a high degree of knowledge and skill. Furthermore, in order to obtain stereopairs of the range that illustrate this article, professional photomicrographic equipment with means for vertical and oblique illumination is a necessity.

Author's Method of Making Stereophotomicrographs

Judge and others[2, 3] have adequately described the various procedures that may be used to make stereophotomicrographs. The writer prefers the method that entails using a monocular microscope; making first one exposure on one half of the plate, and then moving the object (to an extent that depends upon the camera extension) and making a second exposure on the second half of the plate. The writer usually uses a Vickers projection microscope (which has a fixed camera extension of 775 mm. when one uses an objective only, and 525 mm. when one uses an eyepiece), and moves the object sufficiently far to move the image 70 mm. To assist in this he has fastened two small cover glasses (70 mm. apart) to the focusing screen, and the object is set so that the image of a selected area coincides with one of them, an opaque screen being provided to shield the other half of the plate. One half of the plate is exposed and the dark slide is closed; the opaque screen is then moved to protect the already exposed half of the plate and the object moved by the mechanical stage until the image of the selected area coincides with the second cover slip; the second exposure is then made. The two images are reversed on the negative, so the print must be cut in two and the two halves transposed and mounted a suitable distance apart. They will then give the correct three-dimensional effect.

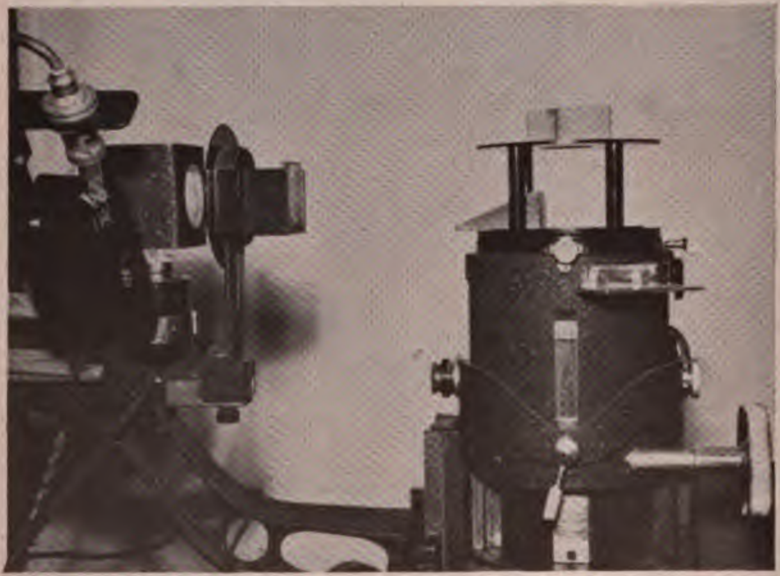


FIG. 2.—*Set-up for studying moulding sands, using a projection microscope with oblique illumination.*

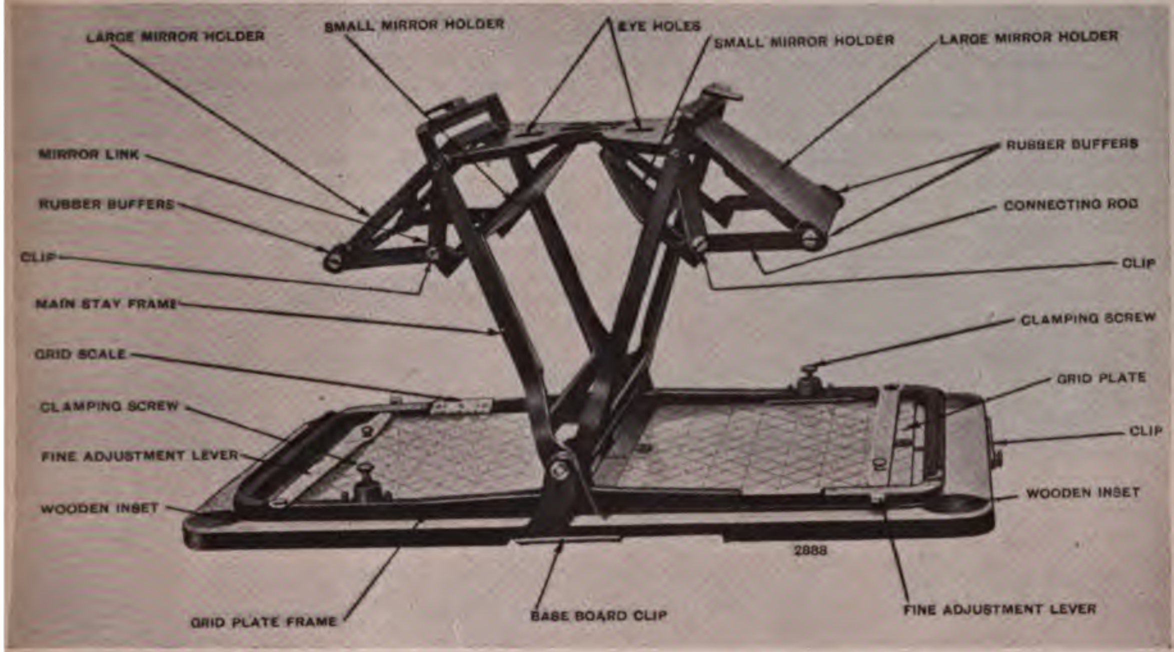


FIG. 3.—*Barr and Stroud (Z.D.4) topographical stereoscope, used for the detailed viewing of stereopairs.*

There is no difficulty in producing stereopairs at 1,000 diameters and upwards. Vertical or oblique illumination may be used, and the photographic procedure is as already described. Fig. 1, at 1,660 diameters, is typical of the results attainable.

Examination of Moulding Sands

Moulding sand is usually photographed at about 25 diameters, the preferred magnification depending upon particle size and the particular feature that is being studied. When using a Vickers projection microscope the writer prefers objectives having a focal length of 25, 50 or 75 mm. When mounted in a 62-mm. collar, and without an eyepiece, these give magnifications of 38, 20 and 12.5 diameters respectively, and the working distances are sufficiently great to allow for oblique illumination, the arrangement being as illustrated in Fig. 2.

Preparation of Samples

Samples of compacted sand may be prepared by cutting them out of the mass with a nail file or similar tool. In order to example the mould surface the sample must be placed directly on the microscope stage, but if one wishes to examine the internal arrangement of the sand particles it is necessary to prepare a fractured surface. The best way to do this is to shape the compacted sand into a small rectangular bar, file a nick around it, and then break it into two pieces.

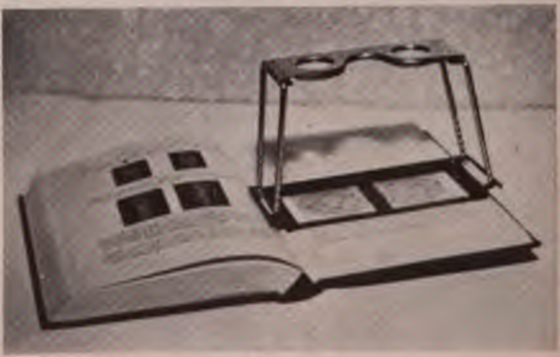
Mounting

Samples of loose (*i.e.* non-compacted) sand are best mounted on a base that will be discernible in the photomicrographs, and the writer uses strips (cut from plain white postcards) stuck on to glass microscope slides. The card is then coated with a thin layer of rubber adhesive, about 2 cc. of sand emptied on to it, and the slide shaken gently to dispose of non-adhering particles. A representative field, where the particles are not too closely packed, must then be chosen.

Detailed Viewing

The best results are obtained with oblique illumination; the angle of incidence is not critical but it should cast appreciable shadows. Stereophotographs should always be focused as sharply as possible, but if part of one of the pairs is somewhat out of focus, the three-dimensional view will be in focus nevertheless. For detailed viewing of stereopairs in the laboratory it is desirable to use a topographical stereoscope, such as a Barr and

FIG. 4.—*Folding stereoscope used when viewing prints on glossy paper.*



Stereophotomicrographs

Stroud Z.D.4 (Fig. 3), that was originally intended for the stereoscopic observation of pairs of aerial photographs. When used for that purpose the ground common to any pair appears in relief, and, from examination of the photographs and the instrumental movements provided, contours may be drawn on the photographs. For measurement of relative heights of ground features a floating mark system is provided, consisting of a pair of glass plates with grid lines etched upon their undersurface. Details of how to make such measurements are given by Judge[2], and also in the instruction booklet that accompanies the stereoscope. This apparatus may similarly be used for examining and evaluating stereophotomicrographs up to 175-mm. square.

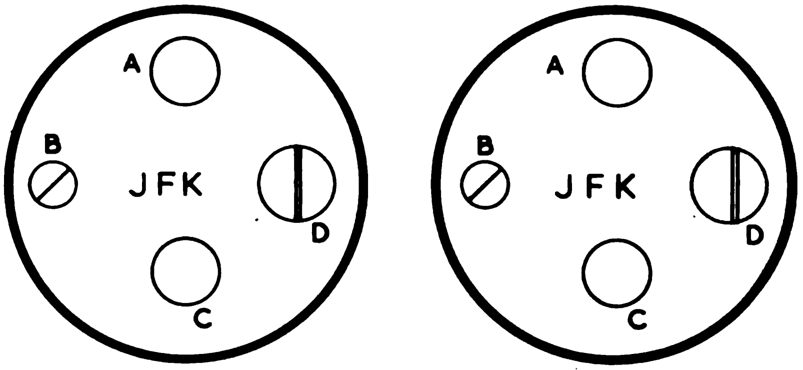
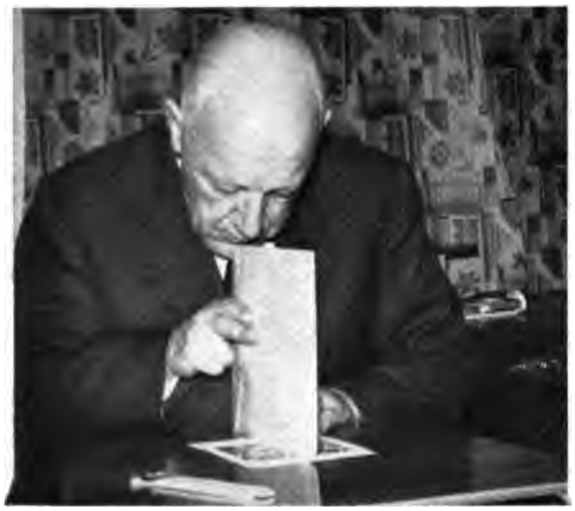


FIG. 5.—*Stereogram recommended by the author for training personnel to view stereopairs without aids.*

Stereopairs in Printed Publications

If stereopairs are required to illustrate reports with a limited circulation, prints on glossy paper may be viewed with a small folding stereoscope such as that illustrated in Fig. 4. Each photomicrograph may be up to 50-mm. square, and they must be mounted with their centres not more than 65 mm. apart. If the use of stereophotomicrographs in printed publications is to make headway it is a *sine qua non* that, when they are reproduced from half-tone blocks, one must be able to observe them in three dimensions with or without the use of a stereoscope. Judge points out that there is nothing worse in a stereo picture than the coarse dots of the half-tone screen as seen under the relatively high magnification of the stereoscopic viewing lenses. If, however, reproductions are printed on art paper, comparatively fine screens can be used, and the stereopairs can be satisfactorily viewed with the instrument shown in Fig. 4, which magnifies by approximately 1.7 diameters. Although this stereoscope is designed for stereopairs mounted 62 mm. apart, it is also suitable for viewing all Judge's 40-odd stereophotographs, which are mounted from 50 and 60 mm. apart.

FIG. 6.—*The author demonstrating a method of viewing without the aid of a stereoscope.*



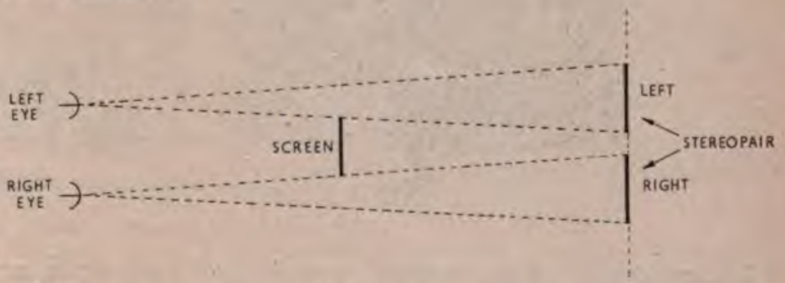
Viewing Without Instruments

Revealing as stereoscopic photomicrographs are, it is improbable that they will be extensively used until it is realized that most people can acquire the knack of viewing them in three dimensions, without instrumental aids, if the centres of the individual prints are not more than approximately 55 mm. apart. The author acquired it in a few minutes but most people take one or two hours, spread over a period of two to three weeks. In order to view a stereopair without a stereoscope one must learn to diverge the eyes so that each eye sees a different one of two photographs, and then to merge the two together to form a three-dimensional image. In other words one must be able to see the right-hand photograph only with the right eye, and the left-hand photograph only with the left eye.

Simple Artificial Aids

First Method: To commence with, some form of simple artificial aid is often necessary, but after a little practice no difficulty is experienced in obtaining a three-dimensional effect by unaided direct viewing. Some authorities recommend that one should first practice viewing two laterally spaced

7.—*Another method of learning to view without artificial aid.*



8.—*Diagram showing the ciple of the method illustrated in* FIG. 7.

k spots, but the author recommends use of the eogram (a line drawing constructed as a eopair) illustrated in Fig. 5. A thick marginal ound encloses four circles marked A, B, C and espectively, and the letters J. F and K. A and C plain circles; B has one chord and D has two rds. When viewed in three dimensions A is ted well above its circle; B is in the same plane ts circle; C is well below its circle and D is itly below its circle; the chord of circle B is he same plane as its circle; the left-hand chord ircle D is in the same plane as its circle, and the t-hand chord is below it; of the letters J, F and is the foremost and K is the hindmost.

nd Method: Another method of learning to stereopairs without the aid of a stereoscope is vn in Fig. 6. The card is about 200 mm. high, is so placed vertically that each eye can see marginal surround and its contents only. A

ation of this method is illustrated in Figs. 7 and here a horizontally located 40-mm. wide strip ed instead of a vertical card.

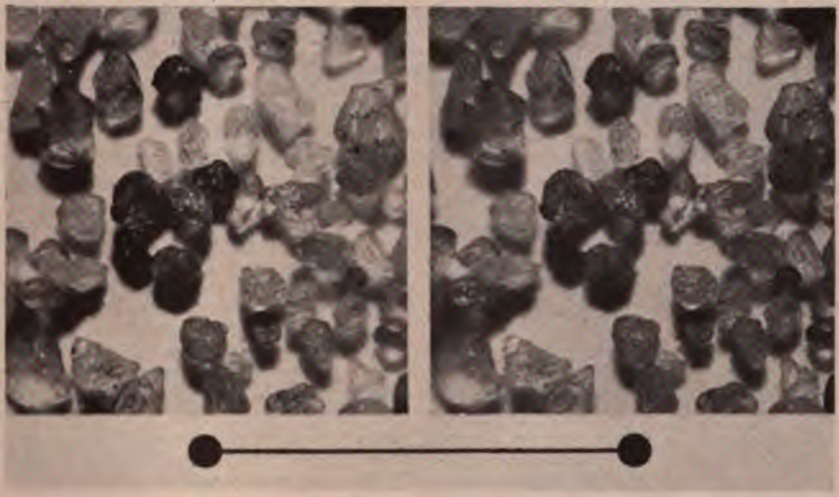


FIG. 9.—*Stereopair of core sand* (× 12.5).

Three-dimensional Image without Aid

By using either of the above methods one can soon learn to merge two images and see one three-dimensional image. After a little further practice it is possible to obtain the three-dimensional image without any aid, but one then sees three images;

viz. a clear, centre image in three-dimensions, and two laterally disposed ghost images.

Conclusion

Judge deals adequately with print width and separation and the writer owes much to his book. The stereopair that illustrated a previous article in this JOURNAL[4] had a separation of 65 mm., but many people find this too great to permit of unaided viewing. The width of separation of the stereopairs and the stereogram that illustrate this present article is 57 mm., and in order further to assist unaided viewing each stereopair is provided with two black discs 57 mm. apart joined by a somewhat thick line. Fig. 9 shows a core sand magnified 12.5 diameters. Fig. 10 at 16 diameters shows a compacted core-sand, and was originally published (in the JOURNAL) with a separation of 65 mm. It is now reproduced with a separation of 57 mm., the print width having been reduced from 62 to 54 mm., and one can now more easily obtain the three-dimensional effect without significant change of perspective.

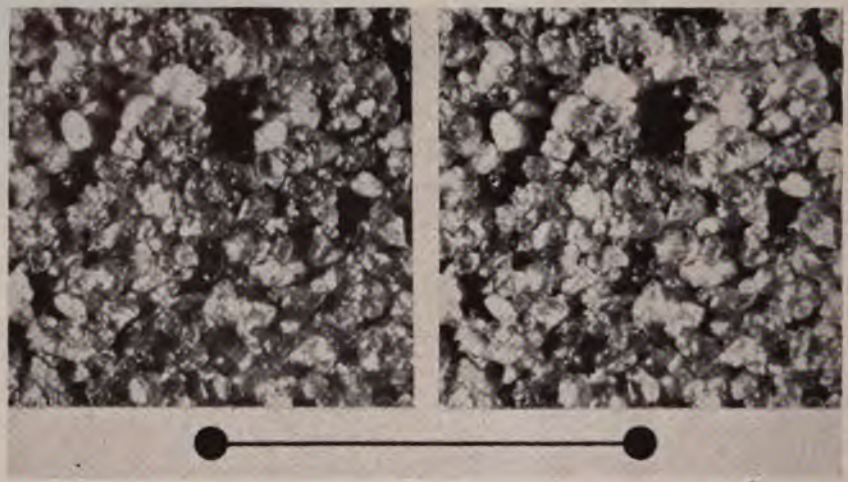


FIG. 10.—*Stereopair of a compacted core-sand* (× 16) *which was originally published in the* JOURNAL *with a separation of* 65 *mm. (see page* 121, *January* 29 *issue). It is reproduced here with a separation of only* 57 *mm., to facilitate viewing.*

REFERENCES

[1] W. Davies, *Foundry Sand Control*, 1950.

[2] A. W. Judge, *Stereoscopic Photography*, 1950.

[3] E. Cuzner, "Practical Stereoscopic Photomicrography by means of a Single-objective Lens," *Photomicrographic Journal*, 1932.

[4] J. F. Kayser, "Compaction of Sand," FOUNDRY TRADE JOURNAL, January 29, 1959.

Market for Outboard Motors

Formal opening on November 10 of a £1,000,000 plant at the Peterborough works of F. Perkins, Limited, subsidiary of Massey-Ferguson, Limited, marked the launching of an attack on world markets for marine outboard engines for commercial and pleasure purposes. The opening ceremony was performed by Mr. M. I. Prichard, managing director.

The engine range comprises 6 h.p. at £82 10s., 16 h.p. at £118, and 35 h.p. at £140—representing reductions of £16, £33, and £36, respectively, on previous quotations. Initial production will be at the rate of 40,000 units a year and the new plant should enable the company to gain a good foothold in the European market where demand is estimated at between 30,000 and 40,000 units a year. The demand in this country is now between 10,000 and 12,000 units.

There is also a strong demand from the Far East and Mr. D. F. W. McNair, a director and general manager of Perkins Outboard Motors, Limited, stated that orders from this and other areas, including the UK, were already encouraging.

Census of Production

Order prescribing the matters about which returns may be required for the Census of Production to be taken in 1960 for the year 1959 has now been made by the Board of Trade. The census is the first of a series of simple annual censuses for the years between the detailed 1958 census and the next detailed census. The Order, which operates from December 31, 1959, is the Census of Production (1960) (Returns and Exempted Persons) Order, 1959 (SI 1959, No. 1858).

Undertakings producing coal, gas, electricity, oil shale, crude or refined petroleum or shale-oil products are exempted from making Census of Production returns. For these, corresponding information will be obtained by the Ministry of Power.

The Census of Production to be taken in 1961 for the year 1960 will be similar to the previous census except that sampling methods will be employed. The questions asked will be similar to those for 1959—total value of goods sold and work done, stocks, and capital expenditure. The total value of stocks held outside the United Kingdom will not be required for 1960.

e French Foundry Association

By P. R. Gordon, B.A.[*]

All countries of Europe now have foundry associations in one form or another, but they differ considerably in structure, in length of existence and in the functions they are required to perform. The French Foundry Association, the *Syndicat Général des Fondeurs de France*, is unique among the European Associations both in its highly integrated structure and the number of tasks it has to carry out. It may be of interest for those who are members of associations in this country to compare it with their own methods and scope of working.

Historical Notes

irst association of ferrous founders in France up in 1870. By 1897 it seemed clear to its 's that, on the whole, this association had d them, and in that year the *Syndicat* ' *des Fondeurs de Fer de France* (General tion of French Ironfounders) was formed, s of the new *Syndicat* being to associate all ous founders of the country in one body. Its vere at the Place des Vosges in Paris, where inal association had its headquarters. This e remained the same until 1921, when the tion was joined by founders specializing in ous work, and hence became representa- he foundry industry as a whole. The name ordingly changed to *Syndicat Général des* *rs de France* (General Association of Founders). By 1939, about 92 per cent. oundry companies in France were members. ie war, this percentage has increased, and indries now are not members. With the in size and work, the *Syndicat Général* eave its offices in the Place des Vosges, and in 1949 to its present building at 2, rue de , a turning out of the Champs Elysées. It sting that, following the amalgamation of large number of regional associations ip under the wing of the *Syndicat Général*. entirely the reverse of the process which l in the ironfounding industry in England, egional and specialist associations existed he central national one was organized.

Present Constitution

nstituted at present, the *Syndicat Général* product sections and 11 regional sections. of its functions—training, research and —are carried out both centrally and region- h the policy co-ordinated from the centre.

duct sections are:

us: pressure pipes and fittings,
light castings,
engineering and jobbing castings,
rolls,
malleable,
cast steel.

Non-ferrous: bronze and copper alloys,
aluminium and light alloys,
pressure-die-castings.
foundries tied to general engineering firms.

Training

As is general now in industry throughout Europe, great stress is laid in France in the foundry industry on efficient training at all levels. A well-trained work force is recognized to be essential if the industry is to compete on level terms with other processes and other countries. Much help is given by the government in the field of apprentice training, among others.

Apprentices

There are two ways for the apprentice to learn his trade in France—he can become indentured to a firm, which will allow him to do part-time study at a government-run school, in addition to giving him practical experience in the foundry, or alternatively, he can be apprenticed to the industry by attending full-time at an apprentice training centre run entirely by the government. One of these centres, at Bezons near Paris, was used for the practical tests in the European Foundry Apprentice Competition held in November last year. Its most ample facilities and excellent design made a great impression on foreign observers present. Firms which do not have an approved training scheme have to pay a training levy to the government of 0.04 per cent. of their wages bill. To become a skilled craftsman, the apprentice has to pass a national examination which ensures a certain standard of practical skill and technical knowledge. The *Syndicat Général* both assists private firms in training their apprentices, and also works very closely with the government department responsible for running the training centres. It also bears a measure of responsibility for the form and content of the craft examinations.

Technologists

The apprentice group is not the only one catered for; the *Syndicat Général* is also closely concerned with the training of foundry technicians and technologists. Here again it functions in two ways. Students of the right calibre are placed in technical colleges which run courses on foundry subjects, from whence they emerge with the appropriate qualification. In addition, the industry runs

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uthor is assistant to the press and publications officer of l of Ironfoundry Associations and is acting as liaison officer ish foundry associations which are members of the European of Foundry Associations.

[illegible] Foundry Association

[illegible] importance [illegible] college [illegible] students who [illegible] qualified [illegible] metallurgists who [illegible] working in a foundry [illegible] qualified [illegible] metallurgists graduate [illegible] since the [illegible] students [illegible] metallurgical [illegible] examinations [illegible] qualified foundry metallurgists.

[illegible] of the *Syndicat Général* [illegible] concerned with attempting to fore[illegible] requirements of the various [illegible] foundry employees and to regulate entry [illegible] industry [illegible] essential consider[illegible] the extent to which the government is involved [illegible] planning system [illegible] the industry should be [illegible] position to make [illegible] probable requirements [illegible]

Technical Centre

Progress [illegible] determined however solely by the men on the shop floor. Research must continue unceasingly, and this is done in France at the *Centre Technique des Industries de la Fonderie* (Technical Centre of the Foundry Industry) in Paris, which also has ten provincial laboratories. The work of the Centre and its regional laboratories is financed by the government by means of a tax levied on all foundries. The Centre is therefore an autonomous body, but naturally works in close harmony with the *Syndicat Général*. There is no need to examine the work of the Centre in detail: it is sufficient to say that fundamental and applied research is carried out on a large scale, and that visits are paid to foundries, at the latter's request, to deal with problems arising in the normal course of working. A problem which has absorbed a great deal of time and effort over the past few years is that of dusts in the foundry, and their nature, whether harmful or otherwise. This work has assumed great importance because of the question of compensation to silicosis sufferers; and the aim behind it is to ascertain as accurately as possible the actual risk at any given work place, and then, of course, to eliminate the dangerous dusts as far as possible.

"Quality Labels"

An interesting function performed jointly by the Centre and the *Syndicat Général* is the operation of a system of "quality labels," which act as a sort of guarantee to the castings buyer. These labels are awarded to any foundry which turns out a consistent standard of casting, and the standard is maintained by a system of checks at varying intervals. It should be noted that the quality label does not afford a guarantee to the buyer in the sense of certifying that the casting will perform a specific function. It implies only that the foundry is [illegible] and is properly staffed and organized, and [illegible] proper and adequate controls over such matters as the chemical composition of the metal. It follows from this, of course, that the average casting produced by a "labelled" foundry is of good quality. The idea [illegible] in the French [illegible] in addition [illegible] that of public relations. [illegible] the existence of the system [illegible] to convince the customer that the foundry industry is [illegible] trying to give him good service. There has [illegible] under the aegis of the [illegible] the *Association Technique de Fonderie* (Technical Association of the Foundry Industry), which has as its principal aim the gathering of technical information on an international scale and its [illegible] dissemination to members. The association is a member of the International Committee of Foundry Technical Associations.

Costing

Much work too has been done by the *Syndicat Général* on the question of costing. This has been given particular impetus in the immediate post-war years by the chronic instability of the French economy, the rate of inflation having varied from a trot to a gallop. Cost matters are now dealt with through the Paris office, and through [illegible] regional offices. The original aim in the costing sphere was to persuade foundries to adopt the uniform method of calculating foundry costs evolved by the *Syndicat Général* during the war. The reasoning behind the introduction of this uniform method was as follows: costing in the foundry industry is a very complicated business, owing to the fact that one foundry often produces a variety of castings; a large part of the costs arising are indirect, and difficult to attribute to a particular casting, or series of castings; it therefore happens that sizeable differences occur in the prices charged to customers by different foundries for identical castings, in spite of actually equal or near costs; this means the founder cannot tell which of his lines is showing a reasonable margin of profit.

"Cost Teams"

The uniform method found acceptance rapidly. Help is further given by the regional costing offices, who send out teams to visit foundries, on request, to assist in organizing costing systems. These cost teams first make a preliminary review of the costs of the foundry concerned, dividing the work into specified categories, then select the "work units" to be adopted, and establish a preliminary table of analysis of costs. The resulting information enables the basic cost characteristics of the foundry to be recognized, such as the tonnage poured, the tonnage of good castings, the values of the work units, the productivity of the workers, and the relationship between certain of the costs. Study of these characteristics allows discrepancies to be noted, and appropriate action is then taken. Following the first visit, the foundry is visited by the team every three months and a similar analysis carried out to enable the foundry to compare its current performance with that of three months earlier. This system is popular with the foundries because, since the team visits the

lry, no form-filling has to be done by the
. The information given by the foundry is,
urse, treated as confidential.

arisons are Possible

t a further advantage was discovered by the
lers using the regional costing offices. This
that they could obtain comparisons with
lers running similar foundries to their own,
stablish with some degree of accuracy their
rmance relative to the rest of the industry
rance. The system, therefore, provides a
anent incentive to founders to improve on
performance, and puts into relief the points
such improvement is most needed.

Other Activities of the *Syndicat*

addition to the major activities outlined, the
cat Général indirectly assists in the negotia-
of wages and conditions of work at the
al level. It maintains close contact with the
nment and its departments, and collects statis-
ith its authority. Also under the control of
yndicat are: a bank for the provision of
m-term loans; a legal company for assisting
ers in disputes with customers; a service for
ng in foundry equipment programmes; a
l transport department for settling disputes
en founders and transport undertakings; a
l purchasing agency for raw materials, and
port service. In short, the *Syndicat Général*
les a service for almost every aspect of a
er's work.

Conclusion

can be said generally, therefore, that the
cat Général works on a much wider scale
he foundry associations in the United King-
due to the fact that it is so highly centralized,
l-embracing as to membership, and wields
great authority throughout the industry. But
st be remembered that any trade association
to do what its members require of it, and
a powerful central executive may suit the
h, the same is not necessarily true elsewhere.
l, the great difficulty lies in assessing the
alue of association work under any circum-
. Without making a most comprehensive
igation into the state of the foundry indus-
n Britain and France, and comparing them,
en estimating to what extent each has been
l or hindered by the greater or lesser degree
centration of powers and scope of activities
association concerned, no conclusions can
awn as to the best form a trade association
ake. Nevertheless, it remains thought-pro-
g to study other people's ideas on the subject,
elps to guard against self-satisfaction, the
obstacle to progress.

PATH BROWN & COMPANY, LIMITED—Mr. John D.
w, assistant general manager, has been appointed
tor. He served for many years in the bridge
onstructional works of Dorman Long (Bridge
ineering), Limited, before joining the Manchester
of Redpath Brown and later becoming manager
company's Edinburgh branch.

Plaster in the Patternshop

By " Chip "

Jobbing shops have to adopt the most economical methods of producing one-off jobs and often the use of plaster-of-Paris as a patternmaking material helps considerably.

Some shops rarely, if ever, use this material but for many jobs it is ideal. For example, the sheet-metal shop of a certain engineering works was called upon to produce a large quantity of helical blades out of material ⅛-in. thick. These were formed from metal discs 7-in. o.d., with a 2-in. dia. hole through the centre, the pitch of the helix being 10 in.

To form them of correct shape, a cast-iron jig was required. To carve a pattern for this from timber would be an expensive operation when expressed in patternmaking time, so one disc was formed as true as possible by hand and used as a means of producing the pattern for the jig.

The method adopted was to place a corebox 7-in. dia. and 10-in. high on to a board and locate a steel spindle 2-in. dia. in the centre. The helical blade was oiled to prevent sticking and placed over the spill so that one end touched the bottom board and the other came level with the top of the box.

Plaster-of-Paris was then poured in and after it had set this outer box was removed and the surplus plaster removed. After being given a coat of varnish the pattern was sent to the foundry together with the centre spindle, which was serrated at the lower end. This was rammed up in the mould and the metal forming the jig cast around it. After cleaning, this jig was ready for use and each blade made on it accurately followed the contour of the original.

Holman Group Expansion

An expansion of activities in the Midlands is projected by Holman Brothers, Limited, Camborne (Cornwall), manufacturers of compressed-air equipment. Based on Birmingham and occupying new premises, the Holman Midlands branch will have a large selling and servicing organization and will deal with all group products, *i.e.*, the products of the parent company, Holman Brothers, Limited, as well as of the subsidiary companies, Climax Rock Drill & Engineering, Limited, Maxam Power, Limited, Goodyear Pumps, Limited, and Dustuctor Company, Limited.

The branch is accommodated in a new building at Lightning Way, Alvechurch Road, West Heath, Birmingham 31. The premises comprise an office block with an area of 1,220 sq. ft. and stores servicing and workshop areas extending over 2,800 sq. ft. Further expansion has been taken into consideration in the design of the new building and it allows for the addition of a second storey to the office block and the expansion of the stores and works area by over 4,000 sq. ft.

The company has been actively engaged in the Midlands for over 70 years with a head office in Sheffield and sub-offices in a number of other centres. The decision to operate from new and larger premises in Birmingham has resulted from the rapidly expanding Holman and Climax business in this area.

Equipment & Supplies

Powder Dispenser for Molten Metal

A powder dispenser is now being marketed by British Oxygen Gases, Limited, Spencer House, St. James's, London, S.W.1, to introduce powders, ferro-alloys, etc., below the surface of molten metals. Hitherto, slag-making fluxes, alloying elements and structure-controlling additions have been mainly added to the surface of a molten bath of metal but sometimes this has resulted in slow rates of reaction, poor chemical efficiency, or low recovery of the added elements. In the treatment of cast-iron, both calcium carbide and graphite can be injected into the molten metal using a stream of nitrogen and an electro-graphite lance. Calcium carbide can be used as a desulphurizer and an addition of 1 per cent., made at a metal temperature of 1,400 deg. C., is expected to halve the sulphur content at any level. Graphite is added as a recarburizer and inoculant and gives a remarkably high recovery. The treatment can be carried out in suitable covered ladles, receivers or induction furnaces (see Fig. 1).

It is reported that one of the outstanding successes of the new technique has been the injection of mixtures of calcium carbide and graphite into iron melted from a high proportion of steel scrap. Normally such iron has a high-sulphur and low-carbon content. Not only can the composition be corrected by the carbide/graphite mixture, but a practice can be established which effects substantial economies in metal costs.

Current investigations in selected iron foundries and alloy steelworks indicate that the powder-dispenser may have a wider field of application. The introduction of desulphurizing and inoculating agents, either separately or together, should increase the scope of dispensing techniques in the manufacture of ductile iron. Other interesting applications will be in electric-furnace steelmaking for the introduction of lime for desulphurizing and also for adding certain ferro-alloys.

The dispenser has been robustly designed for service in foundries and melting shops, it is claimed. It has a capacity of 150 lb. of carbide or 100 lb. of graphite. These powders can be dispensed at rates of up to 30 lb. per min., with a nitrogen consumption of as little as half a cubic foot per pound of material added.

Ventilator Valve

Charlton, Weddle & Company, Limited, Manor Works, Newcastle 1, have designed a new valve, Ventseal, to replace the wood plug/tarpaulin which is in current use. The valve is a permanent fixture in the ventilation shaft, and does not affect the operation, fitting or removal of the actual cowl. Apart from occasional greasing and replacement of the sealing ring, it requires no maintenance whatsoever. Current production embraces cowl diameters from 10 to 36 in. inclusive. Where required, the complete installation can be separated from its coaming for maintenance purposes simply by removing the retaining bolts. Advantages claimed for Ventseal are: absolute watertightness: no provision required for storage; easy fitting with minimum modification to existing coamings, and speedy operation in the event of emergency. Whilst designed principally for marine use, the valve has many applications on land, such as sealing off gases in furnace work, etc.

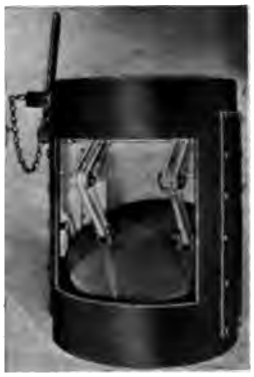


FIG. 1. — *Ventilator valve designed by Charlton, Weddle & Company, Limited, of Newcastle, to be a permanent fixture.*

Maintenance Scheme: Lancashire Dynamo Electronic Products, Limited, of Rugeley, Staffordshire, announce that they have introduced a planned maintenance scheme for customers in the United Kingdom. This scheme will involve four visits to the customer per annum, and will be undertaken on a two-year contract basis with annual payments.

Ferro-alloys: Engineering Services (Manchester), Limited, of Sough Road, Darwen, Lancs, have now commenced production of briquetted and packeted ferro-alloys. The former are to be sold under the trade name of "Cupobrix" and the latter as "Ladlepax." The company will soon be marketing a new type of briquette for cupolas.

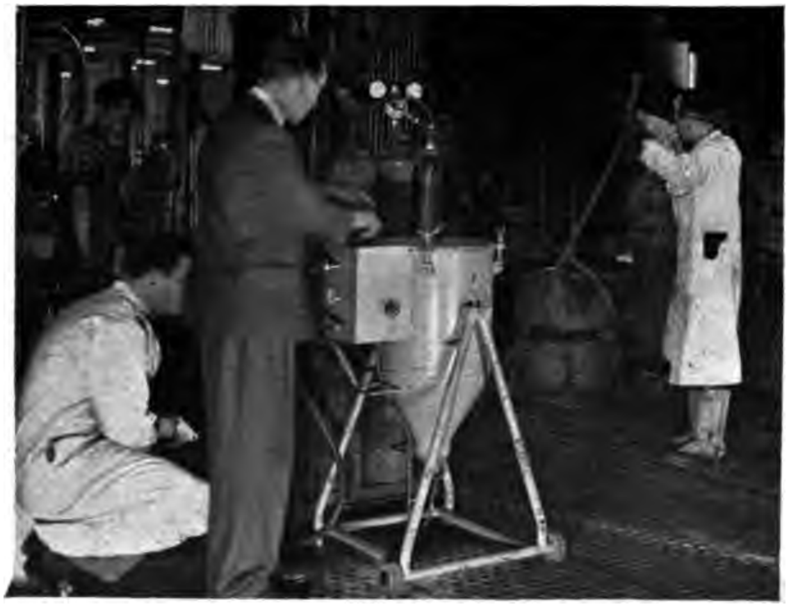


FIG. 1.—*The BOC metallurgical-powder dispenser being demonstrated at a foundry in the London area.*

Moisture Control by Nuclear Device

tonium-239 is now being used to measure the
ure content of moulding sand at General
rs' Central Foundry Division plant in Dan-
Illinois, USA. It is believed to be the first
rial application of this kind. The new tech-
is said to be solving that ancient problem
e foundryman—how to maintain a proper
ure content in sand moulds. The technique
s fast neutrons emitted from 32 gm. of
ium mixed with beryllium powder and sealed
tainless-steel capsule. Plutonium atoms dis-
ate, emitting alpha particles which interact
eryllium to form the fast neutrons. These
eutrons collide with hydrogen nuclei in water
in the sand, producing slow neutrons that
e counted electronically. The number of
eutrons produced is directly proportional to
nd's moisture content.

ore the nuclear device was installed at the
ry, moisture control depended on an experi-
operator's hand-test or "feel" of the sand;
nount of added water in the milling process
ded on judgment. Sand samples from the
r were spot-checked on laboratory equip-

Automatic Operation

new gauging is almost entirely automatic,
utron-source pellet of plutonium-beryllium
er being lowered, through a stainless-steel
nto the centre of each 30-cwt. batch of mould-
nd in the hopper. The slower neutrons, which
from collisions with the hydrogen nuclei, are
onically counted by two neutron detectors in
be carrying the neutron source. From this
which is completed in about 45 sec., there
is rapidly calculated: (1) percentage of existing water in the batch, and (2) the exact amount of water to be added to maintain a predetermined level. The moisture content is indicated on a large dial which also shows the quantity of water needed. The mill operator pushes a button to drop the sand from the hopper to mill, and with a second button measures the desired amount of water into the miller.

Meanwhile, the nuclear device resets itself, to begin counting slow neutrons in the next batch of sand. This checking of every batch reduces human error and ensures close limits of moisture content all the time. It is not a sampling method. The accuracy of this

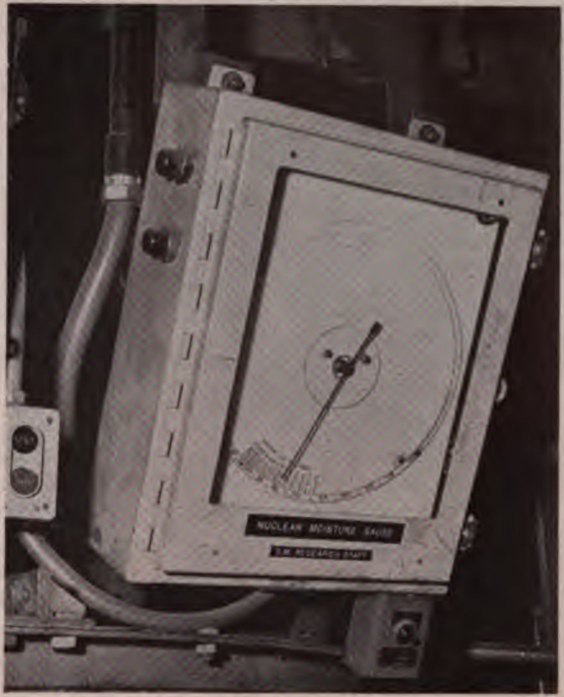


FIG. 1.—*The moisture content of the sand being tested is indicated on this large dial, which also shows the quantity of water needed to give the sand optimum value as moulding material.*

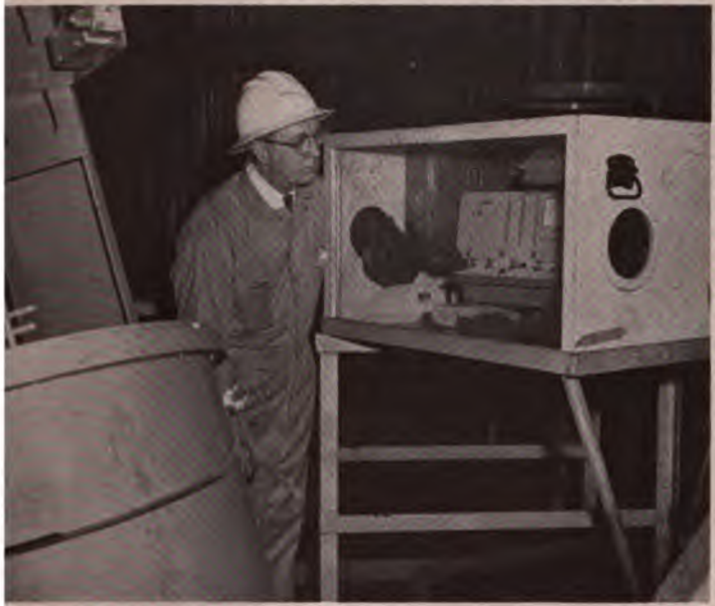


FIG. 2.—*Slow neutrons generated in the sand are picked up by the neutron-counting tubes and calculated by the electronic device illustrated. The drum-hopper containing the source can be seen at the lower left.*

Moisture Control by Nuclear Device

sand moisture gauge is reported to be better than ±0.05 per cent. by weight over a range of 2.5 to 5.0 per cent. total moisture content.

Safety

Plutonium-239 is obtained under special nuclear material licence from the US Atomic Energy Commission, which authorizes the use of the plutonium-beryllium source under prescribed operating conditions. Very rigid safety precautions are taken by the General Motors industrial hygiene section. Operating personnel are protected by regularly-checked film badges, thus keeping any radiation hazard well within safe limits. When not in use, the source is kept in a wax neutron-absorbing shield. Similar shielding surrounds the hopper, providing full protection when the source is in the sand. The sand is not contaminated during the moisture check, and is completely safe for handling thereafter.

This is believed to be the first AEC-authorized foundry application of plutonium, which was selected because of its long half-life of 24,300 years.

Board Changes

BERALT TIN & WOLFRAM, LIMITED—Mr. J. F. Chadwick has resigned from the board.

C. & J. HAMPTON, LIMITED—Col. C. R. Hodgson has been appointed deputy chairman.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED—Sir Walter Worboys has resigned from the board.

CONSTRUCTORS JOHN BROWN, LIMITED—Mr. L. J. Bowler has been appointed a director.

ENGLISH STEEL CORPORATION, LIMITED—Admiral Sir Michael M. Denny has been appointed a director.

FERRANTI LIMITED—Mr. E. Grundy, Mr. J. Prince, and Mr. G. M. Robson have been appointed directors.

UNITED GAS INDUSTRIES, LIMITED—On medical advice Mr. P. P. MacDiarmid is to relinquish his seats on the board and the boards of those subsidiaries of which he is a member.

AUSTRALIAN IRON & STEEL, LIMITED—Mr. Cecil Hoskins has resigned from the board and also as one of the company's representatives on the board of Southern Portland Cement, Limited, having reached the agreed retiring age.

ARTHUR BALFOUR & COMPANY, LIMITED—Mr. L. Wright and Mr. M. R. Balfour have been appointed assistant managing directors. Mr. W. H. Eyre has been appointed a special director. Mr. F. H. Balfour has requested relief from active executive duties at the year-end on account of ill-health. He will remain on the board.

Mr. F. P. ASHLEY has been appointed managing director of the Carrier Engineering Company, Limited. Mr. A. P. FOWLER has relinquished his position as joint managing director, having reached retiring age, and has been appointed vice-chairman. Mr. H. L. GROOM has resigned as joint managing director and a director and has accepted the office of chairman and managing director of Carrier Construction Company, *Limited*, a subsidiary.

Law Cases

Wrong Lifting Method

Stating that one could understand a system growing up where men engaged on piecework used one operation instead of two to save time, Judge E. G. H. Beresford awarded Mr. Joseph Herbert Whitmore, a Smethwick moulder, £154 10s. 4d. damages with costs for an injury to his foot. The plaintiff had been in the foundry industry for more than 40 years, though only three months with the defendant company, the Birmingham Aluminium Casting (1903) Company, Limited.

The accident occurred in May, 1957, when a 4½-cwt. moulding box was dislodged from a pile and fell on to the plaintiff's foot. It was stated that the boxes, which were lifted by a crane, had two slings attached to one end and were then lifted vertically by a crane so that they could be turned over, on top of the stack preparatory to the filling operation. The correct way was to attach slings to all four corners before the box was lowered to the floor, turned over, then hoisted again.

Woman Operator Loses Action

Judge Norman Carr, at Stourbridge County Court, dismissed an action brought by Mrs. May Dunn (51) against Richard Thomas & Baldwins, Limited, for damages for personal injury following an accident at the company's Brockmoor Works. He gave judgment for the firm with costs.

The plaintiff, a shears operator, was injured when an up-ended stillage fell on her foot. The defence denied negligence and claimed that Mrs. Dunn failed to look where she was going and collided with the stillage causing it to fall over. She had had no regard for her own safety and failed to wear safety boots which she knew were available.

The judge stated that in his view no one connected with the firm could be held responsible. It seemed to him that it was an unfortunate accident in which the plaintiff herself came into contact with the stillage and knocked it down.

Massey-Ferguson Organization

A new form of organization for its world-wide activities and the creation of a corporate management group which will devote its attention to the company's operations in world markets is announced by Col. W. E. Phillips, chairman and chief executive officer, and Mr. A. A. Thornbrough, president, of Massey-Ferguson, Limited, agricultural machinery manufacturers, of Toronto, Canada.

These operations have now been concentrated into five centres, each headed by a general manager and identified with North America, UK, France, Germany, and Australia. The new group of corporate executives will now be free to assist the president in all operations of the company.

Executive control of UK operations, which include the large tractor and engine manufacturing facilities acquired this year, will for the time being be assumed by Mr. Thornbrough and its management organization plan will be announced shortly. Massey-Ferguson Holdings, Limited, will continue to carry out the necessary financial and statutory responsibilities in regard to UK subsidiaries. Mr. H. W. Waite, director of finance, Massey-Ferguson Holdings, becomes assistant treasurer (Europe) of the parent company.

BIR Congress

ıe *Bureau International de la Récupération* (BIR) its annual congress last month at the Rhein- sse, in Düsseldorf, under the chairmanship of J. Husler (Switzerland), president of the BIR ıgement committee.

ıe congress was of particular interest since the rcement of the European Common Market and the ›lishment of the European Free Trade Area may have a repercussion on the international flow of e trade materials and also in the field of non- ›us scrap metals. The study of this which has made by an OEEC committee might lead to the ›tion of a more liberal attitude concerning the ictions which affect international exchanges of : materials between OEEC member nations.

p-iron and Steel Section

'om the discussions of the scrap-iron and steel on, it appeared that most of the delegates con- 'ed that owing to the favourable situation in the making industry, selling conditions for scrap-iron steel were satisfactory. A very interesting survey he situation in America was given by delegates ı that country, who explained why prices remained e despite the strike of American steelworkers and developments which may ensue. Concerning the tion in Western Germany, it was hoped that a ›rm free exchange area might be created some in the future.

-ferrous Metal Section

ıe meeting of the non-ferrous metal section was ıded by 26 delegates representing nine countries ıding, for the first time, a delegate from Morocco. Doisy, general delegate, who gave a report on 'elationship of the non-ferrous committee with the C, said that since the BIR non-ferrous section was recognized as a consultative body and had been in- ı to attend meetings of the OEEC non-ferrous nittee, he had been able to give a report to the :C committee on the non-ferrous scrap trade in the ıtries concerned. It was felt that this contact ld help considerably in the efforts which the BIR member countries were making for the liberali- ›n of the non-ferrous metal trade.

ıe technical committee reported that it had now ared a list of additional specifications which it was ›osed to add as a supplement to the N.F.58 list. ;e were being considered by different countries ıpproval.

was announced at the conclusion of the congress the next congress and general assembly of BIR take place in London from May 31 to June 2, ›.

ıstrial Holidays

:cause of growing resentment against the incon- ence of the peak holiday period being tied to traditional August Bank holiday, the Industrial 'are Society has organized a one-day conference s headquarters, Robert Hyde House, 48, Bryanston ıre, London, W.1, on December 8, to enable indus- and commercial executives to consider what ıges are needed in established holiday practices how they might be achieved.

oliday pay costs most firms the equivalent of one ı of their wages bill and they are seeking ways in :h resulting production delays could be reduced employees could enjoy their holidays.

Notes from the Branches

Slough Section

On Tuesday, October 27, 1959, the Slough section of the Institute of British Foundrymen held their monthly meeting in the Lecture Theatre at High Duty Alloys, Limited, Slough. The section president, Mr. S. J. Williams, welcomed the lecturer for the evening, Mr. J. L. Francis (Foundry Services International, Limited), who then gave a paper entitled "Some Casting Defects —their Cause and Cure."

Introducing his subject, Mr. Francis stressed the fact that he wished to avoid creating the impression that castings were more unreliable in soundness than components constructed in other ways, *e.g.*, forged, rolled etc. The main object of his paper, he said, was to illustrate the many techniques which could be used to produce castings giving the utmost satisfaction and service. He pointed out that many defects found in castings could be caused by more than one adverse factor, some of these factors being common to more than one type of defect—in fact, the combination of two or more influences was often responsible. Mr. Francis was emphatic in stating that control over all variables in the foundry should be exercised at all times, if it was hoped to get continued runs of sound castings. Too often he had found foundries leaving things to chance, and by doing so getting a very high incidence of "wasters" during peak periods of production. In these cases it was impossible, without the proper control, to pinpoint the causes of the wastage.

Mr. Francis continued by showing a number of slides of various types of casting defect, and giving his opinion as to the reason for the defect, and a possible cure for each particular problem. Examples of holes, cavities and porosity due to a number of factors were shown and explained. His use of the blackboard to explain various points was excellent, and greatly helped the uninitiated to understand what exactly he was driving at. Unfortunately, time did not permit the complete paper to be read, which was a great pity, since Mr. Francis had many more examples to show. However, the chairman felt that it was essential that some time should be allocated to discussion, and therefore with regret had to ask Mr. Francis to conclude his talk.

The discussion proved that the members present had learnt much from the paper, and were eager to know more. In answering the many and varied questions Mr. Francis was greatly assisted by Mr. S. Rogers, the joint author of the paper.

Mr. Wood, in proposing the vote of thanks to the authors for their excellent paper, felt that it was appropriate to mention the "Atlas of Casting Defects" published by the Institute, which was available to all members. Mr. H. J. Proffitt was very pleased to second, and in doing so wondered, as he put it, "how many such fine specimens of 'wasters' were locked away in the archives of the foundry industry."

International Foundry Dictionary: It is anticipated that the "International Foundry Dictionary," which is being compiled by a sub-committee of the International Committee of Foundry Technical Associations, will be published in about 18 months time. The Dictionary initially will be in eight languages, and the cost is expected to be about 4,000 French francs (approximately £3). To enable the publishers to form a reasonable estimate of the number which will be required, those from the UK wishing to obtain copies should send their names immediately to the secretary of the Institute of British Foundrymen, at 14, Pall Mall, London, S.W.1.

American Letter

Fluidity of Aluminium Alloys*

The difficulty of producing thin-section castings (less than ⅛ in.) in aluminium is due primarily to inadequate "fluidity." This may be improved in practice, however, by judicious choice of alloy composition, and by superheating the melt. A test mould (see Fig. 1) was developed by the authors for determining the exact fluidity of alloys under various conditions of heating, etc. Factors investigated were: (1) The effect of pouring temperature and alloy composition on the fluidity of aluminium-copper alloys; (2) the relative fluidities of several commercial aluminium alloys, and (3) the effect of various mould coatings on the fluidity of aluminium alloys. The fluidity of aluminium-copper alloys containing from 0 to 20 per cent. copper is shown in Fig. 2. It will be seen that, up to about 1 per cent. copper, fluidity decreases, but increases with further alloying. At constant superheat, increasing copper contents (above 1 per cent.) increase fluidity only slightly, whereas at constant temperature the improvement in fluidity with increasing alloy addition is much more pronounced.

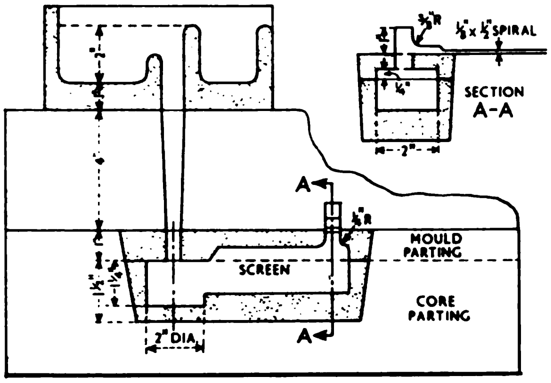


FIG. 1.—*Test mould for the determination of alloy fluidity. The distance travelled by the various metals along the ⅛ by ½-in. spiral, before solidification, was measured.*

Mould Coatings

During the later stages of the research programme, as increased emphasis was placed on the study of mould coatings, it became evident that a test casting with two identical spirals attached to a single runner was desirable—this arrangement permitted comparison of mould variables in a single casting. The effects on fluidity of three forms of carbon used as mould coatings were examined, these forms being lamp black (from an oxyacetylene torch), activated charcoal and graphite. It was discovered that the activated charcoal, applied in a finely divided form in controlled thicknesses by suspending the carbon particles in ether and then spraying the mould, gave an improvement in fluidity of about 40 per cent. Hexachloroethane, which is a chlorinated hydrocarbon of composition C_2Cl_6 which sublimes at 560 deg. F. (293 deg. C.), proved very successful when used as a sprayed mould coating. The improvement effected was 180 per cent. at 677 deg. C., and greater than 110 per cent. at 760 deg. C., as can be seen from Fig. 3. In this test a limited number of alloys were chosen to represent the wide sand-cast range. Table 1 summarizes the results obtained with five different commercial alloys (the two centre columns show the distance travelled along the spiral by the alloy before solidification).

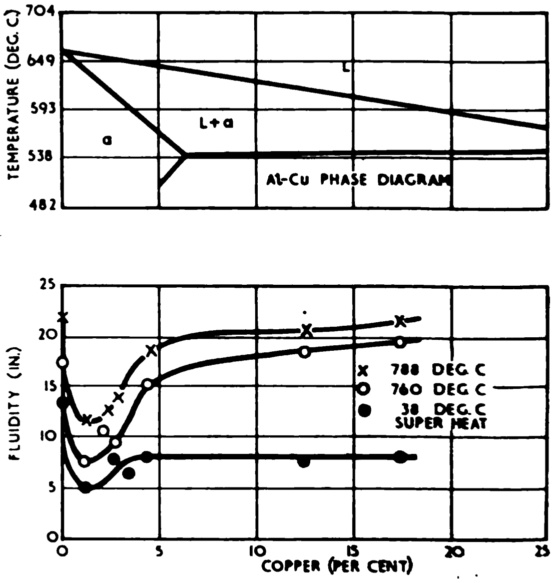
TABLE 1.—*Effect of Hexachloroethane Mould Coating on the Fluidity of Various Commercial Alloys and Pure Aluminium (using the Double-spiral Test)**

Alloy.	Pouring temp. (deg. C.).	Uncoated spiral (in.).	Coated spiral (in.).	Increase due to coating (per cent.).
195 Al-4.5 cu	757 715 677	13.0 6.3 3.8	>28.0 17.9 11.0	— 184 190
356 Al-7 Si-0.3 Mg	732 715 675	15.5 11.9 7.2	22.1 22.1 14.1	43 86 96
220 Al-10 Mg	744 711 678	17.1 10.7 10.3	>28.0 22.9 16.5	— 114 60
40E Al-5 Zn-0.5 Mg-0.5 Cr	732 704 676	8.2 7.2 4.0	13.2 13.2 6.6	61 83 65
99.9 Al	758 715 671	18.7 13.8 9.9	>28 20.4 16.9	— 46 71

* Symbol (>) indicates that the metal ran the complete length of the spiral (28 in.). Therefore these figures represent minimum values.

To ensure that these results would apply in actual foundry practice, they were checked with a test casting. This consisted of two ⅛-in. plates, 10 in. wide by

FIG. 2.—*(top) Al/Cu phase diagram; (bottom) graph of fluidity versus per-cent. Cu, at various temperatures.*



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* Synopsis of a paper, by M. C. Flemings, H. F. Conrad and H. F. Taylor, presented at the AFS Congress in Chicago, in April. Mr. Flemings is assistant professor of metallurgy. Mr. Conrad is research assistant, and Mr. Taylor is professor of metallurgy, in the Department of Metallurgy at the Massachusetts Institute of Technology, Cambridge.

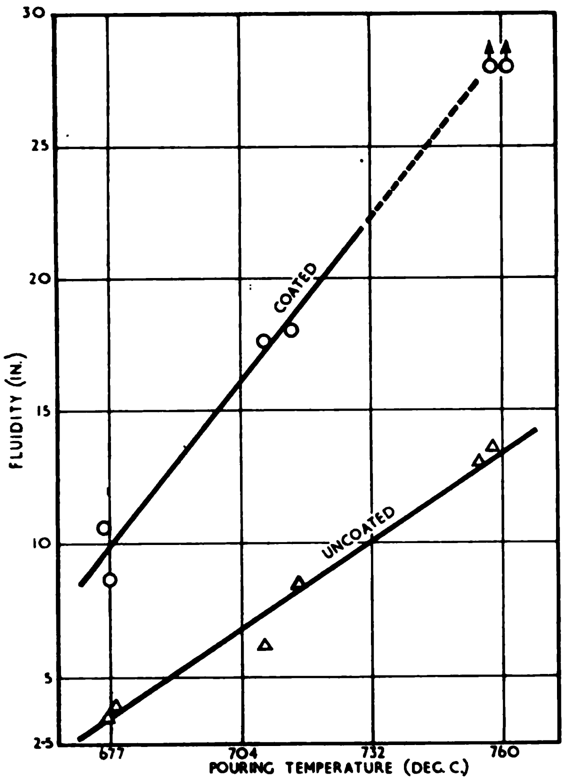

FIG. 3.—*Graph showing the improvement in alloy fluidity effected by a mould coating of* 0.003 *in. of hexachloroethane (sprayed on). A double-spiral test mould was used to obtain these results (one spiral being uncoated), the alloy being Al—4.5-per cent. Cu.*

12 in. long, placed on opposite sides of a large runner and filled from the same pouring basin at the same time as the spiral castings. Ample proof was obtained that the beneficial effect of this coating can be exploited with commercial-type castings.

New High-top-pressure Blast-furnace

The development of a blast-furnace with a top pressure of 40 lb. per sq. in., or nearly four times that of any existing American blast-furnace, has been announced by Dr. W. C. Rueckel, vice-president and general manager of Koppers Engineering and Construction Division. It is estimated that the new blast-furnace will produce twice as much pig-iron as a furnace of comparable size operated at the normal pressure of two lb. per sq. in. Thus, the output of a blast-furnace with a hearth diameter of 28 ft., now averaging perhaps 2,000 tons per day at normal pressures, would be in the range of 4,000 tons per day at 40 lb. per sq. in. top pressure. To erect one of the new furnaces, requires capital investment of only 20 to 25 per cent. more than existing types.

In compensation, labour costs to produce a ton of pig-iron in the new furnace are reduced by 30 to 35 per cent. One of the principal features of the new equipment is the necessity for doubled cast house facilities, including two tap holes, two mud guns, and duplicate runner systems.

Publications Received

BSFA Bulletin, Vol. 2, No. 10. Published by the British Steel Founders' Association, Broomgrove Lodge, Broomgrove Road, Sheffield, 10.

This *Bulletin* is devoted to pattern problems, and is of distinct interest to master patternmakers as it contains over 20 pictures dealing with coreboxes and patterns. The equipment shown is constructed from wood, metal, and epoxy resin. In connection with the the last named process, a detailed description is given of the preparation of this type of pattern. On page 19, there is a good common-sense chapter on "Some Advantages of Steel Castings over Welded Structures," wherein the patternmaker plays an important part. In the next section dealing with the CO_2 Process, it is pointed out that the "mould or core is made in a box using the *appropriate* type of pattern." The word "appropriate" is italicized because the reviewer, when visiting the works of a master patternmaker recently, was told that patterns for use with the CO_2 Process need special care in their preparation. For instance, at those works a special shop had been built and equipped in a dust-free area for the painting of patterns for use with CO_2-bonded sand. It would seem, therefore, that the word 'appropriate' as used in the brochure was deserving of some elaboration. The *Bulletin* makes an interesting and useful contribution on a subject of basic interest to founders.

IWS Supervisor's Handbook and Diary, 1960. Published by the Industrial Welfare Society, 48, Bryanston Square, London, W.1; price 5s.

Into 64 pages, printed on thin paper, there has been assembled a mass of information of undoubted utility to supervisors—an elastic word which in practice seems to include those people ranging between foremen and departmental managers. There are notes on income tax, safety, canteens, the Factory Acts, and many other subjects. The Handbook also contains a list of suffixes and qualifications, etc.; here, it is distressing to find the Institute of British Foundrymen is omitted.

Facts and Figures about British Railways. Published by the British Transport Commission, 222, Marylebone Road, London, N.W.1; *gratis* on application.

Railways have quite a fascination for a multitude of people other than train spotters, whose activities are still a mystery to the reviewer. Whilst the overall picture of the financial side of railway operations is not exactly rosy, it would now appear from this publication that the situation is improving. This year's statistics reveal that the railways are now using more oil than coal, as the increases in the price of coal since nationalization have priced it out of the market.

New Headquarters for British Engine. Issued by British Engine Boiler & Electrical Insurance Company, Limited, Longbridge House, Manchester 4.

This well-produced brochure describes and illustrates the recently-completed new building designed to house the staff of the British Engine Boiler & Electrical Insurance Company under really modern conditions.

New Works for H. C. Hopper (Norwich), Limited —Amendment

Attention has been drawn to ambiguity in the account, published last week, describing rebuilding which is being carried out for H. C. Hopper (Norwich), Limited. It should have been pointed out that it is only the first part of the scheme which is to cost £35,000; the complete expansion programme of the firm is expected to cost £150,000.

Factories Act, 1959

From December 1 the Minister of Labour will be under a statutory duty to promote health, safety and welfare in factories and other places subject to the Factories Acts, by collecting and disseminating information, and by investigating or helping others to investigate problems in this field. This is one of the results of an order—the Factories Act, 1959 (Commencement No. 1) Order, 1959* made by Mr. Edward Heath, Minister of Labour, and published last week. This Order appoints December 1 as the date on which about half the provisions of the Factories Act, 1959, will come into operation, and February 1, 1960, as that on which four other provisions will become effective.

The Order carries out the intentions of the previous Minister, Mr. Iain Macleod, with the one small exception that the operative date for section 7, relating to precautions against explosive dust, is postponed until February 1, 1960; this will allow some employers time to instal new plant to secure compliance with the section. The Order also brings into operation on December 1, the section providing for higher maximum fines for offences under the Factories Acts. Among other sections dealt with in the Order are those requiring floors, passages and stairs to be kept free from obstructions or substances likely to cause persons to slip; and replacing the Minister's powers, under Defence Regulation 59, by new powers to grant exemptions from provisions regulating the hours of work of women and young persons.

The provisions which will be brought into force by the Order on February 1, 1960, apart from section 7, are those which strengthen existing precautions against dangerous fumes or lack of oxygen, those for making workplaces and the means of reaching them safe, and those for the protection of people working near or above containers holding dangerous substances. The Minister intends to bring into operation at the earliest practicable date the remaining provisions of the Act relating to fire precautions, first aid, washing facilities, etc.

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* H.M. Stationery Office, S.I. 1959 No. 1377 (C.15); price 3d. net.

Works Visits

The writer has participated in many works visits, and perhaps the worst type is where the whole of the guests—sometimes numbering more than 100—follow the works manager or other executive like a flock of sheep. More enlightened firms give the visitors a map of the route to be taken together with other useful information, or again the management will use a loudspeaker system to tell the guests on arrival something of the history of the firm and what to specially look out for.

On the occasion of a recent National Works Visits Day, one of the firms, Le Grand Western Foundries, Limited, presented each guest with an illustrated four-page leaflet bearing a message of personal welcome from Mr. A. Talbot, director and general manager, and some notes about the history of the company and its present-day activities. It also carried a picture of the firm's new railway poster. The idea behind this novel gesture of welcome combines a courteous action with a modicum of decorous company publicity.

Technical Education

Speaking in Birmingham on November 7, Mr. H. J. Shelley, formerly H.M. Chief Inspector in the technical branch of the Ministry of Education, said that at present neither side of industry makes sufficient effort to see that apprenticeship ensures adequate training. Certification for craftsmanship was a matter which needed urgent consideration, Mr. Shelley added. He thought that one section of examining procedure which should be regionalized was the Ordinary National Certificate. "In the field of engineering at least it is becoming too remote—in its administration at national level—from the work of the colleges" he said and urged that it would be simple to reorganize it as a regional scheme while retaining national recognition. On the Colleges of Advanced Technology, Mr. Shelley said he hoped that these advanced colleges would not take up a position of splendid isolation.

His opinion was that there would still be an increasing demand for part-time courses at all levels.

Rayburn Window-display Competition

The accompanying illustration shows the representative panel of judges sharing a joke whilst judging the entries in the Allied Ironfounders' Rayburn National Window Display Competition. Left to right are Mr. V. C. Faulkner (Editor, FOUNDRY TRADE JOURNAL*); Mr. Paul Reilly (chairman of the panel and deputy director of the Council of Industrial Design); Lady Casson,* A.R.I.B.A. *(tutor, School of Interior Design, Royal College of Art); Mr. A. Heath,* F.S.I.A. *(display consultant and principal, Cambridge School of Art), and Miss M. R. Schofield (general secretary of the Women's Advisory Council on Solid Fuel).*

Bristol Student's Success

It will be with great satisfaction that members of the foundry industry in the West Country will learn of the recent examination successes of Mr. J. L. May of Bristol. Mr. May, who is employed by Thomas Richards & Sons, Limited, of Bristol, entered that company as an apprentice in 1954 and during his period as an apprentice attended a full course of instruction at the National Foundry Craft Training Centre at West Bromwich. Attending part-time studies at the Bristol College of Technology, Mr. May in 1957 obtained an Ordinary National Certificate in Mechanics of Fluids with a distinction in applied mechanics. This success was followed up in 1958; when taking the City and Guilds of London Institute's intermediate examination in foundry practice Mr. May obtained a first-class certificate, gaining more marks than any other candidate, and thereby winning the C. H. Wilson prize (presented by the Institute of British Foundrymen) and the City and Guilds bronze medal.

Recently Mr May has been advised that in this year's C. & G. final examination in foundry practice, he was again the most successful candidate, being awarded a first-class certificate and the Buchanan silver medal, presented by the Institute of British Foundrymen.

Mr. May's successes will no doubt be shared by colleagues at the foundry, at the Bristol College of Technology (which posesses excellent facilities for the teaching of foundrywork, including a well-equipped model foundry) and in the Institute of British Foundrymen (of which Mr. May is a member).

Dip. Tech. Courses

Compared with a year ago, there are now nearly twice the number of students taking courses leading to the Diploma in Technology, it was stated by Mr. A. A. Part, Under-Secretary in charge of Further Education at the Ministry of Education, when speaking to industrialists at a lunch-time conference at the Bradford Institute of Technology. Mr. Part said that figures, provided by the National Council for Technological Awards, revealed that the total for this year was 3,320 compared with 1,786 last year; over 1,400 of the students were in their first year. The National Council had approved 29 new courses in the year, bringing the total number of courses up to 84. He went on to say that the figures also showed that the Colleges of Advanced Technology were advancing rapidly, and these colleges (including the ninth, Bristol, which is to be designated next September) accounted for three-quarters of all Dip. Tech. students. The total number of advanced students taking full-time and sandwich courses of all kinds had increased from 4,500 in 1955-56 to over 7,100 in 1958-59, and plans so far approved should enable this total to be increased to about 12,000.

Confused Initials

In common parlance one tends to use the initials representing the names of research and manufacturers' associations instead of repeating the full name on all occasions. That this can lead to confusion was shown in last week's issue when reporting the Council elections of the British Steel Castings Research Association, on page 467. It was stated that the stainless-steel gavel presented to Mr. C. H. Kain was designed and made at the BISRA research station. In fact, of course, it was made at the castings research association *i.e.*, BSCRA.

Pension Scheme—Contracting Out

Regulations lay down Procedure and Conditions

The first group of Regulations* dealing with the arrangements for contracting employees (who belong to occupational schemes) out of the new graduated retirement pension scheme have now been made by Mr. John Boyd-Carpenter, Minister of Pensions and National Insurance, and took effect from last Friday. They are naturally of interest to founders who have their own pension schemes as they deal with the procedure for contracting out and the conditions under which occupational schemes may be recognized for this purpose.

The National Insurance Act, 1959, introduces into national insurance a measure of graduated contributions and retirement pensions related to employees' earnings but allows employees in occupational pension schemes, which satisfy certain conditions, to be contracted out. It is planned to start the collection of graduated contributions in April, 1961.

There are two main tests which an occupational pension scheme must pass before it can be used as the basis for contracting out. First, it must provide a pension at least equal to the maximum graduated pension which could be earned in the National Insurance scheme over the same period of service; and second, it must be a "recognized superannuation scheme," being financially sound and with its equivalent pension rights properly secured. The Act also provides machinery for the preservation of these equivalent pension rights on change of employment.

A Registrar of Non-participating Employments will decide applications for contracting out certificates and will issue certificates where applications are allowed. Mr. N. Leach, an Under Secretary at the Ministry, is being appointed Registrar and he is now available for discussion with any employer considering contracting out at 10, John Adam Street, London, W.C.2.

Notices to employees, trustees, etc.

Employers intending to apply for a contracting out certificate are required to give at least one month's notice to the employees concerned, either by individual written notices or posting up notices at the places of employment, etc., and at least one month's written notice must be given to the trustees, insurers and committee of management, if any. The Registrar has to be satisfied that the employer has taken reasonable steps to notify those concerned. Where after notice has been given representations are made against contracting out, the Registrar can defer the issue of certificate to allow time for further discussion between the employer and his employees.

An employer has a right of appeal to an Adjudicator against any decision of the Registrar, and the Registrar may also refer questions to the Adjudicator instead of determining them himself. Mr. Henry Salt, Q.C., has been appointed to fill this position.

In the event of an employer's application to contract out being successful and the Registrar grants a certificate of non-participation, graduated contributions will not be paid for employees covered by the certificate. Instead, the present flat rate contributions will continue to be paid for the flat rate benefits.

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* The National Insurance (Non-participation—certificates) Regulations, 1959, S.I. 1959 No. 1860, price 5d.; and the National Insurance (Non-participation—Benefits and Schemes) Regulations, 1959, S.I. 1969 No. 1861, price 3d.; both of which may be obtained from H.M. Stationery Office or through any bookseller.

IBF Foundry Foremen's Course

A training course for foundry foremen has been organized by the Institute of British Foundrymen to take place from March 17 to 19, 1960, at the Hotel Majestic, Harrogate, Yorks. The course will comprise five lectures as follow: "Overheads and Production Costs," by Mr. A. Kirkham, B.SC. (of the David Brown Companies at Penistone); "The Foundry Foreman's influence on Maintenance," by Mr. W. D. Ford (Morris Motors, Limited); "The Foreman's Rôle in training Apprentices," by Mr. A. Talbot (Le Grand Western Foundries, Limited, Southall, Middlesex); "A Foundry Health Problem, or the Dust, the Devil, and the Doctor," by Dr. Gillies MacBain (Birmid group of companies); and "Automation," by Mr. G. C. B. Lamb (Ley's Malleable Castings Company, Limited).

Accommodation for 200 is available at the Hotel Majestic and the course will be self-contained unless this number is exceeded, in which case it will be necessary for late applicants to stay at other hotels. The charge for accommodation at the Hotel for the full period of the course, including tea on Thursday, March 17, and luncheon on the Saturday, is £5 5s., there being a reduction of 10s. where two participants are prepared to share a twin-bedded room. Bathrooms will be charged extra at 7s. 6d. per night. For those not attending the whole period of the course the charge will be 35s. for bed and breakfast, plus the cost of any additional meals; 10 per cent. will be added to bills to cover gratuities. Forms of application to attend the course may be obtained from the Institute of British Foundrymen at 14, Pall Mall, London, S.W.1, to whom they should be returned not later than February 1, 1960

Metal Castings for USA

The Export Services Branch of the Board of Trade, Lacon House, Theobalds Road, London, W.C.1, record that the Tait Manufacturing Company, 500 Webster Street, P.O. Box 1,045, Dayton 1, Ohio, is interested in receiving quotations from United Kingdom manufacturers for certain metal castings. These include W 4682.—Air chamber in quantities of 3,000, 6,000, 9,000 and 12,000 lots. W 2341.—Brass impeller in quantities of 5,000, 10,000 and 15,000 lots. W 1009.—Cylinder plug in quantities of 30,000 and 60,000 lots. W 4901.—Direct-pressure tank in quantities of 500, 1,000, 1,500 and 2,000 lots. W 8620.—Pump body in quantities of 2,500, 5,000 and 7,500 lots. W 8751.—Pump body in quantities of 500, 1,000 and 1,500 lots. W 8753.—Impeller housing in quantities of 1,000, 2,000 and 3,000 lots. W 2370.—Base and impeller case in quantities of 1,000, 2,000 and 3,000 lots, and W 2372.—Motor bracket in quantities of 1,000, 2,000 and 3,000 lots. The above items should be quoted in two ways: (1) Raw castings only and (2) completely-machined castings.

Manufacturers interested in this enquiry should write by air mail letter to Mr. [illegible] W[illegible], president of Tait Manufacturing Company. Quotations should show both [illegible] and [illegible] prices in United States currency. [illegible] correspondence to the British Consulate General, [illegible] Building, Cleve[illegible] Ohio, [illegible] Please quote reference ESB [illegible] [illegible]

JIC Scholarship

The Joint Iron Council makes an annual award which enables a young foundryman to attend the National Foundry College. The grant will again be made for the College year 1960-61, through the medium of the Institute of British Foundrymen, who will judge the entries. The Institute is therefore prepared to receive applications for the 1960 award from young foundrymen or students preparing for work within the foundry industry. In general, the award will be confined to applicants under 30 years of age, and it is intended for those who wish to take a course at the National Foundry College, though in very exceptional circumstances consideration will be given to rendering assistance for some other form of study.

Applications, addressed to the secretary of the Institute, at 14, Pall Mall, London, S.W.1, should be received not later than December 31. Applicants should be of the educational standard necessary to secure admission to the National Foundry College. Candidates for the award should submit the following information: (a) Name, address and age; (b) name and address of present employer; (c) a chronological account of previous experience; (d) a chronological account of educational qualifications and technical studies; (e) full particulars of any investigational work carried out; (f) whether the applicant has applied to any other body for assistance, and (g) an assurance from the candidate that he has advised his employer of his intention to apply for the award.

It will be the endeavour of the organizers to secure the co-operation of the selected candidate's employer in ensuring him continuity of employment.

Record Steel Production

Highest October figure for steel production so far reached was reported by the Iron and Steel Board. The weekly average last month was 441,400 tons, compared with 363,500 tons in October, 1958, and 437,800 tons in October, 1957. It is not only a record for October, but only just below the record average weekly production figure of 443,2000 tons for May, 1957. The percentage of steelmaking capacity worked to during the month averaged 92.

Pig-iron production was at the rate of 269,800 tons a week, compared with 241,900 tons a year ago, and 285,000 tons in October, 1957.

Latest pig-iron and steel output figures (in tons), with the corresponding 1958 returns, are shown in the following table:—

Period	Pig-iron		Steel ingots and castings	
	Weekly average	Annual rate	Weekly average	Annual rate
1959—August	219,600	11,419,000	387,100	[illegible]
September	251,100	13,057,000	426,400	[illegible]
October (5 weeks)	269,800	14,029,000	441,400	[illegible]
Average	234,200	12,179,000	379,400	[illegible]
1958—August	221,900	11,482,000	290,200	[illegible]
September	231,400	[illegible]	[illegible]	[illegible]
October (5 weeks)	241,900	12,579,000	363,500	[illegible]
Average	[illegible]	[illegible]	[illegible]	[illegible]

Mr. K. Srinivasan has joined National Machinery Manufacturers, Limited, Thana, Bombay, as [illegible] in the foundry raw materials and [illegible] [illegible]

News in Brief

The Kidderminster firm of Scott Electric Vehicles, Limited, has been taken over by Conveyancer Fork Trucks, Limited, a subsidiary of Electro-Hydraulics, Limited, of Warrington.

The old-established firm of Varley (Skipton), Limited, engineers and ironfounders, Providence Works, Cross Street, Skipton, has announced its intention to move to Keighley, although it will be some time before the transfer is made.

A gift of £100,000 spread over 10 years is to be made to the University College of Swansea by the Steel Company of Wales, Limited. The company's chairman, Mr. Harald Peake, said it was hoped the gift would have the effect of accelerating the building programme.

Cockerill-Ougree of Seraing (Belgium) has placed an order for a 4,500-ton press with the Chantiers Réunis de Loire, Normandie. The plant weighs 800 tons and will require more than 100,000 man-hours for its completion. Fifteen months' delivery time has been promised.

The guarantee on the oil engines of British Polar Engines, Limited, Glasgow, and H. Widdop & Company, Limited, Keighley (Yorks), has been extended to cover a three-year period. The increase applies to all engines now under guarantee, all engines now in hand, and to future contracts.

Jardine, Matheson & Company (Japan), Limited, of Tokyo, have been appointed agents in Japan for trucks, buses and related spare parts produced by Leyland Motors, Limited, Albion Motors, Limited, and Scammell Lorries, Limited. Their address is 210-212, Fukuko Building, P.O. Box 282, Tokyo.

The Kilmarnock (Ayrshire) agricultural machinery factory of Massey-Ferguson (Great Britain), Limited, is to resume full-time working after operating a four-day week since August. The move will, however, result in the paying-off of 150 men. About 1,500 men are employed on the shop floor at the factory.

Contract for the conversion of the Bloemfontein Castle, the 18,400-ton passenger liner recently sold to the National Greek-Australian Line by the Union Castle Line, has been placed with Smith's Dock Company, Limited, North Shields. Won against keen foreign competition, the contract was awarded on the understanding that work will be completed in 14 days.

Castrol House, headquarters of the Wakefield Castrol group of companies, is now located in Marylebone Road, London, W.1, opposite St. Marylebone Town Hall. The building covers a site of nearly an acre and contains two restaurants, a showroom, several conference rooms, a cinema, and, on the 14th floor, a residential suite mainly for the use of visiting group executives from overseas.

Mr. F. N. Lloyd, managing director of F. H. Lloyd & Company, Limited, Wednesbury, presented long-service awards to employees of the company at a dinner on November 14. Awards worth £3,000 were distributed; 66 employees received a gold watch for 40 years' or more service, 16 with 35 years' service received a television table, and 29 with 25 years' received badges and smaller-sized tables.

Lord McCorquodale, chairman of the Industrial Training Council, formally opened on November 12 the £60,000 education centre of the Lockheed organization at Leamington. The centre, covering 16,000 sq. ft., is claimed to be among the most comprehensive in Britain. Its facilities for the organization's 150 apprentices and trainees include a machine-shop, a drawing office, a work-study laboratory and lecture and conference room.

Notice of its intention to place a £1,000,000 switchgear contract with the company has been given to Associated Electrical Industries, Limited, by the Central Electricity Generating Board. The switchgear will comprise the first 275-kv. circuit breakers of this rating to be installed in the country and will be used in Thorpe Marsh power station, near Doncaster (Yorks). The equipment will be manufactured at the Willesden works of the AEI switchgear division.

Sir George Dowty, once an apprentice at the Worcester engineering company, Heenan & Froude, Limited, and now chairman of the Dowty group of companies, made the first presentation of the "Sir George Dowty Challenge Cup" which he has given for award annually to the Heenan "Apprentice of the Year." Receiving the award was Mr. John C. Slater who started his engineering apprenticeship with the company in 1955. He completes his apprenticeship next year.

The first step in the policy of greatly improving their national coverage was the opening, by Griffin & George, Limited, of a branch at 626, Welbeck Road, Walker, Newcastle-on-Tyne, on Tuesday last. To celebrate this step, two exhibitions have been arranged. The first of these at the Heaton Assembly Rooms, Heaton Road, Newcastle-on-Tyne, 6, from November 17 to 20, and the second at the Corporation Hotel, Corporation Road, Middlesbrough-on-Tees, from November 23 to 25, 1959.

Steel production in the Common Market countries this year is expected to reach 62,500,000 tons—4,500,000 tons more than in 1958. At the end of September there were standing orders for 12,000,000 tons, compared with 8,500,000 tons at the end of January. Production last month set an all-time record for the Common Market with 5,979,000 tons, compared with 5,538,000 tons in the previous month. Estimated production for the last quarter of the year is 16,700,000 (14,200,000) tons.

Firth-Vickers Stainless Steels, Limited, Sheffield, now the biggest producer of stainless-steels in Europe, celebrates its 25th anniversary this month. The company was formed in 1934 for the stainless-steel interests of the English Steel Corporation, Limited, and Thos. Firth and John Brown, Limited, by whom it is jointly owned. Mr. C. E. Holmstrom, who retired from the managing directorship last year, started with the firm at the beginning, from the Firth-Brown side, as sales manager. He is still a director.

"Marked improvement in world demand for industrial raw materials is expected," said Mr. R. C. Hesketh-Jones, executive in charge of overseas operations for the British Oxygen Company, Limited, at the first national sales conference held in Toronto by British Oxygen Canada, Limited. "Britain, western Europe, and the United States, all are moving into a boom phase, with resultant heavy demand for raw material imports." He said that the British economy was in its soundest position since the last war. It was now gaining a powerful stimulus from the current high level of exports brought about by rising demand for manufactured goods in the raw material producing countries and the ending of the recession in the United States. Western Europe, he said, was now beginning to gain advantages from the formation of the Common Market.

Prevention of Sand-entrained Defects in Steel Castings

This very useful article is a translation from the June issue of the Journal d'Informations Techniques des Industries de la Fonderie. Casting height (that is the distance between the level of the liquid metal in the ladle, and the mould) is stressed as being a most important factor.

It has been noticed that, in any series of castings, the number of sand and slag inclusions encountered can vary in the ratio of 3 to 1 when the casting height is reduced from 28-32 down to 6-8 in. The influence of casting height is much more definite than that of the temperature of the metal. Tests carried out showed that, even when the steel was cast hot (1,610 to 1,680 deg. C.), there was no significant change in the degree of sand entrainment. It has also been found that regularity of pouring rate is of more importance than time of filling. In addition to the above factors, precautions are of course necessary in the actual making of the mould and its runner system. In this connection it should be pointed out that, where staff are meticulously careful, defects from entrained sand can be considerably reduced, especially when the runner system is properly thought out.

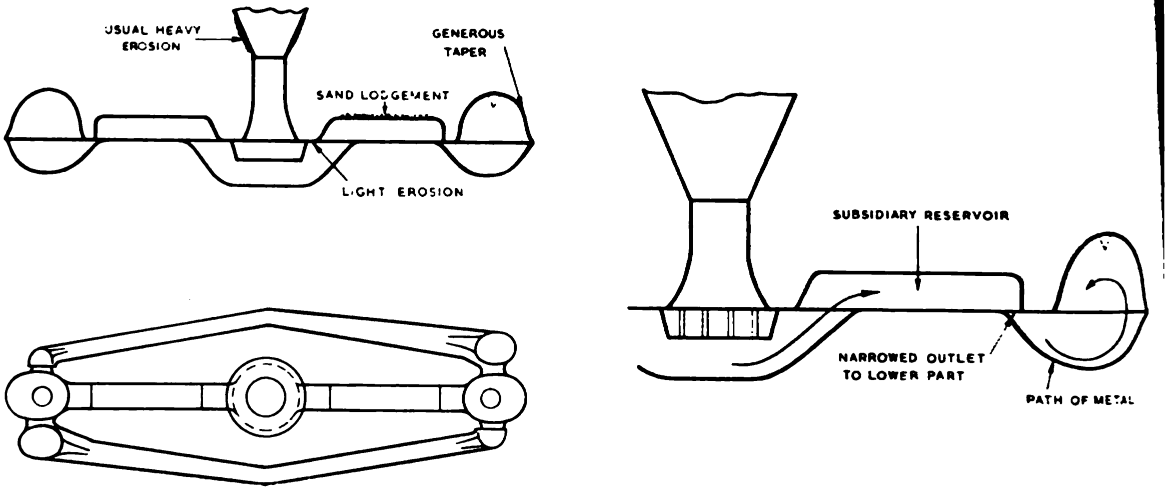

FIG. 1.—*Plan and elevation views of a special runner system, designed in a French foundry, which incorporates a subsidiary reservoir to prevent slag entrainment in metal entering a mould.*

Study of a Runner System

Consequent upon a study of a runner system, every precaution having been taken during moulding and closing as well as casting, a system was designed to catch, through the use of an appropriate set-up, any inclusions before they entered the mould cavity. Numerous tests have resulted, in the particular case shown in Fig. 1, in the creation of a layout which does arrest the slag entrainment before the metal enters the mould cavity, even though serious erosion has taken place in the basin and the runner. As is shown in the two illustrations, a subsidiary reservoir has been incorporated in the top part of the mould. To be effective this reservoir must be perfectly formed, and it is essential that the metal passes to the bottom part through a narrowed section, and is then submitted to a rotary motion (having a theoretically horizontal axis) before running laterally into the mould cavity.

Outstanding Results

The results from the set-up have been outstanding, and it should be pointed out in this connection that, from the beginning to the conclusion of the experiment and the final adjustment of the system, the number of defects due to sand entrainment have been reduced in the ratio of 10 to 1. It should be understood, however, that this happy result has only been achieved with one particular casting. However, it does demonstrate the possibilities—apart from the normal precautions necessary during moulding, closing and pouring—of developing, for quantity production, runner systems offering a solid guarantee of good castings. Every individual case, according to the shape, size and detail of the casting, will need a separate study, which can nevertheless frequently result in a layout similar to that described above. The French foundry people have christened this set-up the "jumping" runner, which seems a very appropriate description.

Personal

Mr. Peter Jefferey has joined Union Carbide, Limited, as assistant publicity manager.

Mr. R. Boothroyd has taken up a post as lecturer in patternmaking and foundry work at Huddersfield College of Technology.

Mr. J. Higginbotham, Mr. W. G. A. Jenkins and Mr. F. A. Ross have been appointed to the board of Edgar Allen & Company, Limited.

Mr. W. Wearing has been appointed to the position of lecturer in charge of foundry and patternmaking courses at Wednesbury technical college.

Mr. D. B. Craig, managing director of David Craig & Sons, Limited, Dalkeith, has been admitted to membership of the Edinburgh Merchant Company.

Mr. H. J. Patterson, of Dorman Long (Bridge & Engineering), Limited, has been elected honorary treasurer of the Export Group for the Constructional Industries.

Mr. J. L. Wilson and Mr. G. D. Myers have been appointed additional directors of Wilson Brothers & Company, Limited, brassfounders, Eldon Road, London. N.22.

The new chairman of the Chamberlain group of companies is Mr. Leslie F. Chamberlain. His appointment follows the recent death of Mr. Walter E. Chamberlain.

Dr. A. Rees Jones has been appointed to the board of Parkinson & Cowan, Limited. He remains a director and general manager of Parkinson Cowan (Appliances), Limited, a subsidiary.

Mr. John Blakiston, M.I.Mech.E., will be in India from the end of this month to mid-January in connection with his position as foundry and heavy-engineering adviser to the Indian Government.

To-day H.R.H. the Prince Philip, Duke of Edinburgh, paid a visit to the Cricklewood Works of S. Smith & Sons (England), Limited, where he officially opened the new Smiths centre in the headquarters building.

Mr. W. H. Barnes, vice-chairman of Qualcast, Limited, Derby, has resigned from the board because of advancing years. Mr. J. R. Fleming, joint assistant managing director, succeeds Mr. Barnes as vice-chairman.

Mr. W. B. Lane has been appointed a director of Wolseley-Hughes, Limited, on its acquisition of the capital of Rapid Magnetic Machines, Limited. The management of Rapid Magnetic will remain unchanged under Mr. Lane.

Mr. S. Hibbert Russell, who retired recently from his position as chairman of S. Russell & Sons, ironfounders and engineers of Leicester, attended the Buckingham Palace Investiture on November 10 to receive his O.B.E.

Mr. Thomas A. Thorneycroft has been appointed chairman of Bairds & Scottish Steel, Limited, in the place of Mr. A. K. McCosh, who recently retired from the board. Mr. J. E. Govan, secretary of the company, has been appointed a director.

Mr. J. Bonham-Carter has been appointed assistant general manager of the Eastern Region of British Railways in succession to Mr. A. J. White, who has retired. Mr. Bonham-Carter was planning officer (electrification) in the office of the Region's general manager.

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Personal

The new factory of the Prestcold division of the Pressed Steel Company, Limited, at Swansea, is to have as production director, Mr. Cecil F. Tracey, who originally went to the Pressed Steel factory at Cowley, Oxford, to take charge of the planning operations for the Swansea factory.

Mr. A. S. D. Barratt, technical director of Edwards High Vacuum, Limited, is resigning from the board at the end of the year to become an independent consultant. His association with the company will, however, be maintained by his appointment as technical consultant to the company.

The retirement is announced of Mr. H. D. Boyd, a director of Edgar Allen & Company, Limited, Sheffield. Mr. Boyd, who joined the company in 1906, was elected a director in 1933 and continued in an executive capacity until 1956, though he retained his seat on the board until the present time.

Mr. Charles Henry Crabtree, chairman of R. W. Crabtree and Sons, Limited, engineers, Leeds, and also of the Crabtree Foundry Company, Limited, ironfounders, Holbeck, Leeds, has retired from the hon. treasurership of the Leeds Musical Festival because of the pressure of business engagements.

Mr. G. R. McKenzie has been appointed managing director of the Carborundum Company, Limited, of Manchester, as from January 1, 1960. He will succeed Mr. W. B. Cleverley, who has announced his intention of retiring from the board on December 31. Mr. T. G. G. Peterson will succeed Mr. McKenzie as controller.

Sir Evelyn Baring and Mr. Thomas McIver have joined the board of Swan Hunter & Wigham Richardson, Limited. Sir Evelyn was until recently Governor and Commander in Chief, Kenya, and Mr. McIver has been general manager of the company's Wallsend shipyard since 1954. Mr. P. L. Jones will retire from the board at the annual meeting in May, 1960.

Union Carbide Limited announce that Mr. L. E. Whitmore has been appointed director and general manager, polyethylene division; Mr. J. F. Widman previously director of marketing, chemicals, becomes director and general manager, chemicals division; and Mr. R. Wilson has been appointed a director of Union Carbide, Limited, and becomes director and general manager, alloys division.

Mr. Leslie Wade, who is serving his apprenticeship at Sterling Metals, Limited, Coventry, obtained the highest marks of the 359 candidates who took the 1959 advanced examination in patternmaking of the City and Guilds of London Institute. For this achievement he has been awarded, by the Institute of British Foundrymen, the Tom Makemson memorial medal and prize, which will be presented to him at a meeting of the Birmingham branch of the Institute on December 9.

The following have been appointed new Justices of the Peace for Sheffield Magistrates' Court: Mr. John Mitchell Birkhead, patternmaker, of Greystones Road, Greystones, Sheffield; Mr. John William Chadwick, managing director of W. Sampson and Company, electrical engineers, Pitt Street, Sheffield; Mr. Robert Percival Phillips, company director and past-Master Cutler, of Riverdale Road, Sheffield; Mr. Stanley B. Rippon, general sales manager in the heavy construction division, Newton Chambers and Company, Limited, Thorncliffe, and Dr. Charles Sykes, deputy chairman and managing director of Thos. Firth and John Brown, Limited.

Executive changes are to be made in the English Electric Company's traction organization following the retirement of Mr. C. M. Cock as general manager of the traction department at the end of this year. A new appointment of Mr. H. J. H. Nethersole as general manager of traction has been made. Mr. Nethersole, who has been managing director of the English Electric Company of South Africa (Pty.), Limited, since 1947, will relinquish his post, but will continue as a member of the board of the South African company. He will be succeeded as managing director in South Africa by Mr. R. B. Price, who is already a director of the South African company.

Mr. Muir M. Oddie, of Spencer & Halstead, Limited, has bought Heath Hall and its associated farm privately from the executors of the late Mrs. Diana Gray, owners of the Heath Estate. Heath Hall is a 35-roomed Georgian mansion, once the pride of the village of Heath, near Wakefield. It was designed by John Carr, the renowned Horbury architect, in about 1782, and was last used as a residence in 1914. It became a hospital during the first world war, and was used for billeting troops during the last war, before becoming a supply depot for the West Riding County Council 11 years ago after being used as a hostel by public works contractors. Although the Hall is in a very poor state at present, Mr. Oddie hopes to live in it eventually.

Sir Guildhaume Myrddin-Evans, K.C.M.G., C.B., Chief International Labour Adviser to Her Majesty's Government, and Deputy Secrtary to the Ministry of Labour, will be retiring from public service on December 17. On the international side of his duties at the Ministry of Labour, Sir Guildhaume has been closely associated with the work of the International Labour Organization. Since 1945 he has been principal delegate of the United Kingdom Government to international labour conferences, and has been the United Kingdom Government representative on the governing body of the Organization. Mr. H. F. Rossetti, C.B., Deputy Secretary to the Ministry, will succeed Sir Guildhaume on this work, and will accompany him to the meeting of the governing body of the ILO in Geneva this month.

Obituary

Mr. Thomas Peattie Cochrane, a director of Cochranes (Bo'ness), Limited, has died at the age of 75.

The death occurred on November 5, at the age of 67, of Mr. Percy Martin Watts, proprietor of the business of Martin H. Watts Exors., brass and iron founders, Catherine Street, Macclesfield.

The death has occurred of Mr. John Edward Barrow, aged 69, formerly an overseer in charge of boilers at Leys Malleable Castings Company, Limited, Derby. For some time he was a power-station engineer in Hongkong.

The death occurred on November 8 of Mr. Albert Hargreaves, chairman and managing director of the Wright Hargreaves Engineering Company, Limited, Blackburn. Aged 73, Mr. Hargreaves had been managing director of the company since 1911, when it was known as George Hargreaves & Sons, Limited. He continued as managing director following the amalgamation in 1948 with the Wright Dairy Equipment Company, Limited, of Southport, when the present name was adopted. He became chairman in 1950, on the death of Mr. J. Charnock Wright.

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Employment Bill Criticized

At the dinner in Birmingham, on November 12, of the Midland branch of the Institute of Directors, Mr. Enoch Powell, M.P., a former Financial Secretary at the Treasury, criticized the new Local Employment Bill, the aim of which is to steer industry into the areas of unemployment and limit new industry in the congested areas. Directors of companies, he said, knew better than "the Gentleman in Whitehall" how to arrive at policy decisions regarding their firms and one of the major factors in decision was locality. Yet there was a real danger that on this matter of locality the doctrine that the man at Whitehall knows best may win acceptance. He agreed that there was a small minority of cases where the economic advantages of alternative locations were finely balanced, but he held that it was fallacious for an outside authority to tip the balance by the refusal of an industrial development certificate. Congestion was often an economic asset Mr. Powell went on. The instinct to get close to other producers and other markets was a sound one and there was no reason to suppose that excess was not self correcting.

Another line of argument Mr. Powell said, was that the economic distribution of industry ought to be corrected to avoid social evils and a waste of social capital. "Even if on the national balance sheet some of this capital has not quite been written off, who knows whether the saving by continuing to use it is not more than counterbalanced by the economic loss on production," Mr. Powell queried. Mr. Guy Chantrey, chairman of the Midlands branch of the Institute, also spoke and the main gist of his speech was the problem of transport. Control of traffic, adequate parking facilities and congestion on the roads must be given top priority he said.

Patents Delegation visit to Russia

The Comptroller-General of the Patent Office, Mr. Gordon Grant, C.B., is at the head of a small delegation which is to visit Russia to discuss the protection available in the USSR for British inventions. He will be accompanied by Mr. William Wallace, Assistant Comptroller of the Industrial Property Department, and by Mr. H. R. Mathys, Fellow of the Chartered Institute of Patent Agents and a director of Courtaulds, Limited.

During the visit of the trade mission last May, led by the President of the Board of Trade, the Russian authorities agreed to provide facilities for a United Kingdom team with a knowledge of Patents procedure to study the working in the USSR of the laws for the protection of inventions -a subject which increases in importance as trade between the two countries increases. Although the Russian Patent law of 1941 is available for study in this country and a few Russian Patents have been taken out by United Kingdom firms, the law has recently been revised and there is little knowledge here of how Russian procedure works in practice. The USSR is not a member of the International Industrial Property Convention, to which most of the Western nations as well as the majority of the countries of Eastern Europe belong.

Mr. FREDERICK NEWTON, a director and one of the founders of Newton Bros. (Derby), Limited, electrical engineers, of Alfreton Road, Derby, has died at the age of 74. For many years he held the position of technical consultant to the firm, as well as being a *director.*

House Organs

Die-casting News, No. 3. Published by the Zinc Alloy Die Casters Association, 34, Berkeley Square, London, W.1.

It is a desirable activity to show to die-casters and their customers a series of excellent pictures of components showing good design. This preponderating feature of design was well brought home to the reviewer recently when he examined a broken bracket for a domestic gadget. It failed to conform with elementary rules of good design, and when a replacement part was procured, that, too, soon fractured, and the gadget was discarded. Good design is just as important in die-casting as in every other branch of the industry. Moreover, conformation to basic foundry requirements, which in essence involves the blending of corners and shapes, usually produces a better-looking article.

Tin and Its Uses, No. 47. Issued by the Tin Research Institute, Fraser Road, Greenford, Middlesex.

The issue contains an article by Dr. W. E. Hoare on "Modifying the Structure of Cast Iron by Additions of Tin." This is a very controversial subject, and the reviewer counsels *va piano* with the use of tin for this purpose until more agreement in metallurgical circles has been established. In the meantime, however, foundrymen should certainly familiarize themselves with the research work so far undertaken. Another article in the magazine which is of great interest to foundrymen, is an illustrated description of the new Alice-in-Wonderland bronze statuary group recently erected in Central Park, New York. It was cast in 70 separate pieces by the Modern Art Foundry of that American city.

Butterley Foundry News, No. 3. Issued by the Butterley Company, Limited, Ripley, Derbyshire.

This issue illustrates and describes castings which the company has made for W. H. Allen Sons & Company, Limited, and the making of turbine-casing castings for Fraser & Chalmers of Erith. Both these companies used to operate their own foundries. There are two other articles in the magazine, one is about the Meehanite Foundry School and the other is entitled "The Importance of Grain Structure." This little magazine is unique amongst foundry house organs, as it is addressed to the company's customers.

Foseco Foundry Practice, No. 136. Issued by Foundry Services, Limited, Long Acre, Nechells, Birmingham.

This issue contains an article on the foundry of 1978, by Mr. D. Lie Eide, which was accorded the first prize in a competition organized by Foundry Services, Limited. Whilst the system described is novel and imaginative, it is far from what the reviewer visualizes will be the foundry of the future.

One and All, Vol. 6, No. 24. Published by Tangyes, Limited, Birmingham.

House organs take many forms, but this one is designed to interest and inform the firm's agents. Thus it carries descriptions of new types of plant marketed, important jobs recently carried out by the company and its exhibition activities. For large firms the reviewer deems it wise to foster interest in recent matters with which the agencies should be familiar.

Cast-iron Garden Urns: Mr. T. M. Stothert of Cranes Hall, Cranes Lane, Lathom, Ormskirk, Lancs, would welcome information from any foundry possessing patterns of decorative Victorian garden urns.

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Raw Material Markets

Iron and Steel

Output of castings at the ironfoundries continues to vary from one establishment to another. The engineering and speciality foundries maintain their comparative supremacy in production, as the demand for high-quality castings from many users is substantial. Foundries supplying castings to the motor vehicle trade are particularly well employed. From many other trades come appreciable demands for high-duty castings, including the heavy engineering and electrical trades, agricultural implement makers, and the machine-tool trade. The steelworks are also now taking much larger quantities of castings. The requirements of the machine-tool trade are improving slowly, but from collieries and railways there is only a moderate call.

These foundries continue to obtain most of the pig-irons of their choice without difficulty, but certain brands of the low-phosphorus irons are not now so easily obtainable, particularly for prompt delivery. Following the recent increased demands, some producers have now disposed of their stocks and are dependent on current outputs, which are fully covered for some weeks ahead. Hematite pig-iron is in good supply, although demands for this grade continue to expand.

The high-phosphorus pig-irons are still the most plentiful, and the foundries using this grade, including the light-casting trade and the textile and some of the engineering foundries, are able to obtain the tonnages they require without difficulty. Increased demands continue to come from the light-casting trade as well as from some of the engineering foundries, but the usage by the textile foundries remains moderate. Producers have tonnages to spare from current production and appreciable stocks are also held by them. Export orders continue to help in reducing stocks; fairly good shipments have been made recently.

Most of the re-rollers are working full time. The call for small bars and light sections is at a good level and reinforcing rods are in heavy demand. To implement the work now on hand and to obtain an adequate working stock, there is an expanding demand for steel semis, including billets, blooms, and slabs, and orders already booked by home steelworks are absorbing present outputs fully and for many of them will continue to do so until early next year.

Non-ferrous Metals

The way in which the US copper industry has set its face against any overall settlement of its present difficulties defies description. Indeed, it raises the question as to whether something basic to both management and labour is at stake with neither side daring to pose the issue publicly. After all, when the strike started about three months ago there were several hundred thousand tons of copper overhanging the market and production in the major copper-producing centres of the world was going full steam ahead. In these circumstances there were many who felt that a strike of reasonable duration would be a good thing to take up the slack and put a firmer basis to the price structure. In the event, however, nothing of the kind has happened. The price has risen only very gradually in the US, despite stocks being run down to vanishing point, custom smelters being unable to quote a price and producers retiring from the market—temporarily—because of lack of copper to sell. A very strange situation indeed.

The unions were well aware when they struck that copper stocks in the hands of consumers and producers were abnormally high, so that it cannot be said that they went idle with their eyes shut. Meanwhile, the most mystifying thing about it all is that neither side has made much effort to get the truce ball back in play, so that after three months it is hardly any wonder that the whole market structure is beginning to crumble. At present, those US producers still having copper to offer are now asking 33 cents a pound, the price level to which Anaconda raised its sights last week. There is still no price quoted by the US custom smelters.

What then of the outlook? It would seem only reasonable to assume that more negotiations are taking place between the copper companies and labour than has been, or is being, admitted to the Press. And if that view is reasonable it is also reasonable to assume that a settlement will come quicker than most observers think. Apart from conjecture, the outlook on known information looks desperate and is made the more so by the growing belief that the longshoremen, brought back to work by the Taft-Hartley Act, will go idle again after Christmas. The price for No. 2 scrap in New York now stands at 27 cents a pound.

The London market, though a fairly roaring proposition, is unable to take the best advantage of the US situation as it is heir to every rumour that blows down Whittington Street. Last week was no exception and, after overcoming the misstatement that a strike settlement had been reached on Phelps Dodge Arizona property, it was then beset by that old bogey—impending releases from the US stockpile. These ill-winds certainly show up its vulnerability, as does the fact that it takes a great deal of notice of the New York Commodity Exchange. Anyway, the London market prices are jumping up and down, but there seems no reason to believe that the overall trend will be anything rather than upwards in the absence of labour peace in America, especially now that the steelmen are back on the job.

Tin is another market which has suffered somewhat from misleading, or, rather, unconfirmed statements. In particular, there was the opinion given that the buffer stock had now been depleted down to its last 3,000 tons and this, no doubt was a help to the market price and any speculators. However, Mr. P. G. Smith, chairman of the committee of the LME, went on record as saying that this estimate was wide of the mark, as was another estimate that the buffer stock was down to around 6,000-6,500 tons. Yet, a perusal of Mr. Smith's statement to the members of the LME on this subject shows that it is a masterpiece of avoiding action, so that the rumours have not really been dealt with as yet satisfactorily. However, a damper to tin market enthusiasm was announced at the end of last week in the shape of 2,500 tons of tin to be made available to the buffer stock manager from the Board of Trade on December 28. This release is subject to agreement of the International Tin Council, which meets next month.

In so far as the market in London is concerned, the cash price is now nudging the £800-a-ton level and, despite the action taken by the Board of Trade, demand is strong enough to hold the present level. The US market is dull, with the price below $1.02 a pound.

Lead is still slightly more active than it has been in the past, but there is plenty of metal about again to satisfy demand. The US market is quietly steady without feature and the price is unchanged at 13 cents a pound. Zinc, though somewhat uncertain after last week's setback, is still experiencing satisfactory demand and the price is holding nicely around £95 a ton. The US East St. Louis spot quotation is still called 12½ cents a pound.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

November 18, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent, C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in. and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 11s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £247 10s. 0d. to £248 0s. 0d.; three months, £237 10s. 0d. to £238 0s. 0d.; settlement, £248 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 6d. per lb.; rods, 275s. 6d. per cwt. basis; 20 s.w.g., 310s. 6d. per cwt.

Tin.—Cash, £797 0s. 0d. to £797 10s. 0d.; three months, £797 0s. 0d. to £797 10s. 0d.; settlement, £797 10s. 0d.

Lead (Refined Pig).—Second half November, £73 5s. 0d. to £73 7s. 6d.; second half February, £73 5s. 0d. to £73 7s. 6d.

Zinc.—Second half November, £94 15s. 0d. to £95 0s. 0d.; second half February, £89 15s. 0d. to £90 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 7s. 6d.; rolled zinc (boiler plates), all English destinations, £128 2s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0⅜d. per lb.; sheets to 10 w.g., 223s. 0d. per cwt.; wire, 2s. 10⅜d.; rolled metal, 223s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £162; B6, £209.

Brass (High Tensile).—BS1400, HTB1, £219; HTB2, £210; HTB3, £227.

Gunmetal.—BS1400, LG2, £203; LG3, £213; G1, ½%, £268; G1, 1%, £256.

Phosphor Bronze.—BS1400, PB1 (AID released), £301; BS1400, 90/10/1, —

Leaded Phosphor Bronze.—BS1400, LPB1, £222.

Phosphor Bronze Strip, etc.—Strip, 314s. 9d. per cwt.; wire, 4s. 3⅜d. per lb.; rods, 3s. 6¾d.; tubes, 3s. 6¾d.; chill cast bars; solids 3s. 6¼d.; cored 3s. 7¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 0½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 5½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 4½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £248; AB2, £258.

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* Average 68-70 per cent.

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Company News

Richard Lloyd, Limited, manufacturers of machine-tool equipment, etc., of Birmingham—Ordinary shareholders will receive on December 8 a distribution of 3d. per 5s. share from the realization of capital assets.

Charles Clifford, Limited, manufacturers of non-ferrous metals, of Birmingham—It is proposed to pay a capital dividend of 1s. 6d. per £1 ordinary unit to holders on November 25. The proposal will be considered at an extra-ordinary meeting on December 1.

Heenan Group, Limited, holding company for manufacturing engineers, etc., of Worcester—The dividend for the year to August 29, 1959, is increased to 15 (10) per cent., with a final of 12½ per cent. Group profits advanced to £521,469 (£419,481) and the net profit is £258,880 (£169,314).

Birmingham Small Arms Company, Limited—Final dividend on the £5,630,344 ordinary is being raised to 9½ (8) per cent., making 12½ (11) per cent. for the year to July 31, 1959. Trading profit is £2,469,819 (£2,261,707), tax absorbs £1,335,976 (£1,275,113), and the profit balance is £1,210,522 (£1,056,726).

Hale & Hale (Tipton), Limited, malleable ironfounders, of Tipton (Staffs)—The final dividend is raised to 15 (10) per cent., making 20 (15) per cent. for the year ended August 4, 1959. In addition there is a capital distribution of 3s. per 5s. share (nil) from profits of £142,857 realized on the sale of investments. Group trading profit is £74,869 (£70,699).

Thomas Blackburn & Sons, Limited, structural and general engineers and ironfounders, etc., of Preston (Lancs)—There will be no dividends for the year to June 30, 1959, compared with a previous ordinary dividend of 5 per cent. Loss after charging all expenses is £224,119. A 12-month moratorium was granted by the creditors in June in respect of the company's liabilities.

Wellman Smith Owen Engineering Corporation, Limited An extra-ordinary meeting is called for November 26 to create 800,000 £1 ordinary shares and to effect the one-for-two scrip issue to holders on November 20. The directors consider it preferable to defer declaration of any interim dividend until early in the New Year, when it could be made payable on the increased capital.

Cochran & Company Annan, Limited, engineers and boilermakers, of Annan (Dumfriesshire)—Reduction to 9 (8) per cent., tax free, is announced in the dividend for the year to June 30, 1959, with a final of 7 per cent. The total for 1957-58 included a special interim of 2 per cent. Profit fell to £199,093 (£273,238), and after tax of £104,985 (£157,559), the net profit is down to £94,108 (£115,679).

Ransome & Marles Bearing Company, Limited—The increase in demand experienced in the latter part of 1958-59 has continued with a resultant increase in the order-book, and with output running at a high level, says the chairman, Mr. E. W. Senior. Now that the political uncertainty surrounding the industry has been dispelled, he believes that there is every reason to expect the economy to continue to expand.

Midland Aluminium, Limited—The chairman, Major C. R. Dibben, says that indications are that the company should be able at least to maintain the level of profits with reasonable anticipation that in some directions there may be an improvement. The need for conserving cash, he says, is paramount if the group is to continue expansion plans. Group net profit for the year to June 30, 1959, is £119,337 (£84,058) and a dividend of 15 (12½) per cent. is being paid.

John I. Thornycroft & Company, Limited, marine engineers, ship builders and repairers, of London, S.W.1—New ship orders are urgently required to maintain continuity of work after next April, states Sir John Thornycroft, chairman. The management is constantly investigating and planning how manufacturing and servicing assets can be used to the best advantage. A group net loss of £65,214 (profit of £208,901) was incurred in the year to July 31, 1959, and the dividend is cut to 6 (7½) per cent. A year ago there was also a 1 per cent. capital distribution.

Crompton Parkinson, Limited, manufacturing electrical engineers, of London, W.C.2—The chairman, Mr. Albert Parkinson, believes members can expect a year in which trading conditions will be considerably more difficult and it is to an expansion policy that holders must look for the maintenance and development of profitability. In the year ended June 30, 1959, trading surplus declined by £48,618, but there was an increase of £116,732 in trade investment income, giving an overall increase of £68,114 at £2,755,691. The dividend is increased to 14 per cent. compared with 12 per cent. for the previous year, and a one-for-four scrip issue is proposed.

Mr. H. W. Secker, chairman of Thos. W. Ward, Limited, states he is reasonably satisfied with the outlook for interests in scrap, shipbreaking, cement, quarries, supply of contractors' plant, supply and construction of railway sidings, motor-car distribution, and the re-rolling of steel. He cannot be so sanguine about those sections concerned with heavy engineering and the machine-tool industries. A one-for-one scrip issue is proposed and Mr. Secker makes it clear that it must not be assumed that an increase in dividend will automatically follow the capitalization. On present indications it is unlikely, he says. Certain aspects are being considered by legal advisers and when these are settled the necessary meetings will be convened. Group turnover decreased by about 11 per cent. to £43,230,000 in the year ended June 30, 1959, but the net profit rose to £1,442,519 (£1,174,130). The dividend is increased to 25 (20) per cent.

Increases in Capital

Davies Steel Specialities, Limited, Cardiff, increased by £95,000, in £1 ordinary shares, beyond the registered capital of £5,000.

Vacwell Engineering Company, Limited, London, S.E.1, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

John Harper & Company, Limited, malleable iron and brass founders, etc., of Willenhall (Staffs), increased by £1,000,000, in £1 shares, beyond the registered capital of £500,000.

Prudential Engineering Company, Limited, mechanical and general engineers, etc., of London, W.1, increased by £13,900, in £1 ordinary shares, beyond the registered capital of £100.

Bridport Industries, Limited, manufacturers of twine, rope, netting, etc., of London, E.C.2, increased by £100,000, in 4s. ordinary shares, beyond the registered capital of £450,000.

Alfred Beckett & Sons, Limited, steel, file, saw, and machine knife manufacturers, etc., of Sheffield, increased by £10,000, in 100,000 ordinary shares of 2s., beyond the registered capital of £100,000.

Tenable Screw Company, Limited, mechanical and general engineers, etc., of London, S.W.19, increased by £40,000, in 16,000 unclassified and 24,000 10 per cent. cumulative redeemable preference £1 shares, beyond the registered capital of £20,000.

Colin Thompson (Engineering), Limited, manufacturers of and dealers in agricultural machinery, etc., of Norton Fitzwarren, near Taunton (Somerset), increased by £8,000, in one founder and 7,999 ordinary shares of £1, beyond the registered capital of £8,000.

Imperial Aluminium Company, Limited, London, E.C.2, increased by £3,220,000, in 415,000 redeemable cumulative preference and 2,805,000 ordinary shares of £1, beyond the registered capital of £2,695,000. The increase is for the purpose of acquiring the undertaking, comprising the production sale, and distribution of wrought aluminium products, carried on by the metals division of Imperial Chemical Industries Limited.

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New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

807,775. National Lead Company, 111 Broadway, New York, USA.

Cold-chamber die-casting apparatus. The invention refers particularly to improvements in the charging apparatus for a cold-chamber shot-sleeve.

807,868. Vyzkumny Ustav Obrabeicich Stroju A Obrabeni Praha, 24 Na Zertvach, Prague VIII, Czechoslovakia.

A process and apparatus for the casting of objects without the use of moulds with solid walls.

807,938. Societe D'Electro-Chimie, D'Electro-Metallurgie et des Acieries Electriques D'Ugine, 10 Rue du General Foy, Paris, 8, France.

Improvements in, or relating to, the manufacture of composite-metal articles, consisting of two or more steels or ferrous alloys.

808,319. Stanton Ironworks Company, Limited, near Nottingham.

Improvements in blowing cores for castings. Sand is driven from a vessel in a stream of air into a corebox lying beneath the vessel, and having an open bottom. A series of core supports is carried successively in and out of register with the bottom of the corebox. Air is automatically admitted to the vessel after each support has been carried into register and released through a port in the vessel before each support is carried out of register. A claim is also put forward by the inventors to provide for a hopper from which sand can flow to the vessel. This flow is cut off before the admission of air, and re-established after the release of air. (See also B.P.776,031, FOUNDRY TRADE JOURNAL, August 15, 1957.)

808,345/6/7/8. Herman Pneumatic Machine Company, Union Bank Building, Pittsburgh, 22, Penns., USA.

Centrifugal-casting apparatus is described in Patent No. 808,345, while a method and apparatus for compacting a mould-forming material in a rotating flask is patented in specification 808,346. This latter is concerned primarily with the formation of an elongated, generally cylindrical mould of compacted mould-forming material—such as may be employed in the casting of, for example, hollow pipes. Reference is made to a previous patent, B.P.650,683, for this apparatus. B.P.808,347 also deals with a centrifugal-casting apparatus, which is claimed to be simpler and speedier than hitherto known methods. Herman Pneumatic's last Patent in this series, B.P.808,348, deals with a foundry moulding machine of the centrifugal type. The company claims to be able to "effect the consolidating of the mould-forming material in the flasks without offsetting the mandrels (used for compacting), and by a simple angular movement of the flasks. The mechanism is simpler, easier to operate, and less likely to require adjustment."

808,364. Bakelite, Limited, 12, Hobart Place, London, S.W.1.

In the manufacture of shell moulds, this invention relates to a method by which a mixture of sand and resin is blown into a mould cavity formed between a hot patternplate and a contour plate, through holes in the contour plate. The hot pattern with the uncured shell on it, is moved from the contour plate, and the shell mould baked while still in position on the pattern. By this method, it is claimed, any de thickness of shell may be obtained at any determined point. A variety of resins may be u for example, phenolic, silicone and urea resins.

808,444. National Lead Company, 111 Broadway, York, 6, New York, USA.

Metal metering apparatus for delivering meas amounts of molten metal in die-casting processe

808,573. Walter McFarlane and Company, Limi Saracen Foundry, 73, Hawthorn Street, Glas N.2.

A method of manufacturing cast-iron pipes, suc rainwater pipes, by centrifugal casting. The pi according to this invention, are cast with flat ears w project from, and are integral with, the socket e (See also B.P. 310,224.)

808,585. George Fischer, A. G., Schaffhausen, Swit land.

This invention relates to machines for automati mounting weights on moulds before casting, and removing and returning the weights after casting.

808,834. Metropolitan-Vickers Electrical Com Limited, 1-3, St. Paul's Churchyard, London, E

Improvements in vacuum casting, eminently, bu exclusively applicable to precision casting of lon objects. The process is claimed to enable a surface finish or definition to be obtained. (Se B.P. 722,816, which describes the shell mould fo in conjunction with the present invention.)

809,025. Zentralinstitut für Giesserei-technik, Ge Ellrodt-Strasse, Leipzig. W.34, Germany.

A method of producing sand moulds for the ca of hollow crankshafts and similar articles. The in tors employ vertically-stacked moulding-box secti the height of which is determined by the axial le of the work piece to be cast.

809,098. Compagnie de Pont a Mousson, Place Ca Cavallier, Nancy (Meurthe-et-Moselle), France

Rotatable, metallic tubular devices used in mach for centrifugally casting pipes and the like. Betw a concentric shell and a sleeve there is an an space in which there are a number of closed el collars arranged along the shell. Each of these co is formed of a helical spring which is bent in the of a toric ring around the shell. The coils in the s are open, or in non-abutting relation, and the two of the spring are interconnected either by a fast device or by welding. Owing to this new applica of helical springs, the inventors have found that centering of the shell in the sleeve is absolutely pe irrespective of the variations in the dimensions of shell, due to thermal expansions in the cour machine operation.

Recent Wills

WOOD, HANSON, a director of Lumbys, Limited, boilermakers, ironfounders, etc., of Greetland, near Halifax (Yorks) ... ...

MATTHEWS, SIR RONALD, deputy chairman of the Independent Television Authority, former chairman of the London & North Eastern Railway, Master Cutler in 1922, chairman of Turton Bros. & Matthews, Limited, the Sheffield steel firm, late chairman of General Refractories, Limited, former director of the Brush Electrical Engineering Company, Limited, Marshall, Sons & Company, Limited, J. P. Skinner & Company, Limited, and other companies ... ...

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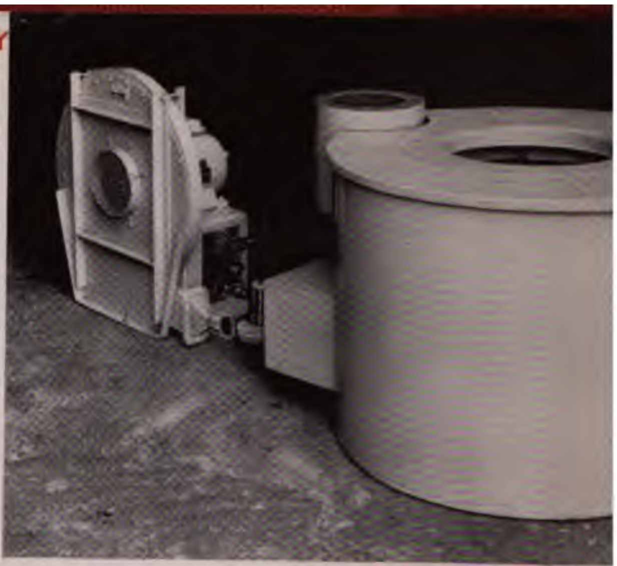

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District Representatives:
G. P. ELLIOTT
(Northern Area)
'phone:
Altrincham 1334

T. H. SMITH
(Scotland)
'phone:
Dumbarton 1046

D. C. RYALL
(Southern Area)
'phone: TRAfalgar 6171

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Vol. 107 NOVEMBER 26, 1959 No. 2242

Second Non-ferrous Foundry Report

Perhaps out of its true context, we are using the recently-issued second Report of the Joint Standing Committee on Safety, Health and Welfare Conditions in Non-ferrous Foundries* to suggest to all Government departments that they should state the post-free price of their publications, as a courtesy to prospective purchasers. (Our postal department reports that this particular Report requires a twopenny franchise.) The main Report is quite short and consists of but three paragraphs. The section from the Technical Sub-committee, however, runs to 22 paragraphs, and must be read by all non-ferrous foundrymen, because it contains all the essentials of a lengthy Appendix, " Health Aspects of Non-ferrous Foundry Processes, " prepared by Dr. W. D. Buchanan.

The excuse for including this long Appendix is that—because of progress—conditions are not static, and potential new health hazards are continually being introduced, such as dermatitis from shell-moulding and frost-bite from the CO_2 Process. The latter we deem to be of the sort which are of much less importance than the ordinary risks of one's daily life. A sensible suggestion is that, as fuming is continuous from some molten alloys, they should be poured into moulds as near to the furnace as possible. A further recommendation is the reduction of fume by controlling temperatures so that neither the alloy itself nor the pot used as a ladle for it is overheated. Waiting while metal cools down to the correct pouring temperature causes prolonged fuming and excessive metallic losses. A warning is given that the use of beryllium can be a serious health hazard and here is a case where the fumes must be completely suppressed. To a somewhat lesser extent, this also applies to cadmium alloys. The action to be taken where yellow-phosphorus burns occur is to cover the affected area with wet pads containing 2 per cent solution of copper sulphate.

The Sub-committee has very intelligently taken out the " meat " from the medical Appendix and the Report would have suffered but little from the elimination of that section. This is because the list of potential dangers is so long that perspective is lost. The mention of such ailments as frost-bite and athletes' foot—the latter emanating from the showerbaths—tend to detract attention from the main issues. The Appendix, however, is valuable as a " yellow light ", indicating—often by reference to other industries—where industrial diseases may arise in the future.

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Dinners

INSTITUTION OF PRODUCTION ENGINEERS

Foundry and heavy-engineering industries were strongly represented amongst the 550 members and guests of the Institution of Production Engineers assembled at dinner in the Dorchester Hotel, London, last Thursday. The guest of honour was Sir Charles Goodeve, O.B.E., F.R.S., director of the British Iron and Steel Research Association; the chair at the function was taken by Mr. G. Ronald Pryor, president of the Institution. After "The Queen," it was Mr. Pryor who proposed the toast of "The Guests," the response being made by Sir Charles. Amongst other pertinent comments, he urged industrialists to support improvement of Commonwealth relations, even to the extent of surpassing the objectives of the Colombo Plan. Once a business in this country was secure, he said, its directors should consider setting up a second business in a less-well-developed country, and here, Commonwealth countries should receive first choice. This new company should not be run solely with the objective of making a profit, he added, but as a means of spreading prosperity and a higher standard of living in the country of adoption. It was in this field that British industry had the opportunity to resume its place in the lead of other nations, he opined.

Awards

The programme continued with presentations of the Institution's premier annual awards, as follows:

George Bray Memorial Lecture, 1958. To Mr. Mark Bogod for his paper entitled "The Search for Productivity in a Food Industry."

Sir Alfred Herbert Paper, 1958. To Sir Cecil Weir for his paper on "The European Common Market, the Free Trade Area, and the Production Engineer."

Viscount Nuffield Paper, 1958. To Dr. N. P. Inglis for his paper entitled "Production, Fabrication, Properties and Uses of some of the Newer Metals."

Lord Semphill Paper, 1958. To Lord Douglas of Kirtleside for his paper entitled "The Aircraft Industry—a National Asset."

Institution Medal. For the best paper presented by a non-member to a region or section this was awarded to Dr. J. E. Littlechild for his paper on "Production Problems associated with Industrial Atomic Energy."

The Institution Medal. For the best paper presented by a member to a region or section, and also the *Hutchinson Memorial Award* were given to Mr. A. J. Lawrance for his paper entitled "The Application of Spark-erosion Machining." (This is only the second occasion in the history of the Institution that these two awards have been won by one person.)

J. D. Scaife Medals were awarded jointly to Professor N. A. Dudley (for his paper entitled "Output Pattern in Repetitive Tasks, with Special Reference to Compensating Relaxation Allowances"), and to Mr. W. J. Kease for his paper on "Computer-assisted Production Control."

The Schofield Travel Scholarship was won by Mr. S. D. Hollander.

At the conclusion of the proceedings, Mr. H. W. Bowen, O.B.E., chairman of Council of the Institution, voiced members' thanks to Sir Charles for attending the function, presenting the awards, and giving the gathering such an inspiring talk.

ASSOCIATION OF LIGHT ALLOY REFINERS AND SMELTERS

The annual dinner and ladies' evening of the Association of Light Alloy Refiners and Smelters was held at the Trocadero last Thursday under the
manship of Mr. R. Hahn. The toast of the Asso
was proposed by Mr. L. Fletcher and responded
the chairman, that of "The Guests" by Mr.
Kee and Mr. L. H. Tarring replied. Among
guests were Mr. D. L. Haviland, C.B., and Mr.
Harries, C.B., from the Ministry of Aviation; Mr.
MacMahon, C.M.G., and Mr. D. Carter from the
of Trade; Mr. Wilfrid Brown, Mr. G. A. Ride
A. P. Fenn, Mr. W. D. Mendham and Mr. A.
from the Light Metal Founders' Association; Mr.
Clotworthy, Air Commodore W. Helmore, C.B.
E. G. West from Aluminium Development Assoc
Mr. H. G. Herrington from Aluminium In
Council; Mr. G. L. Bailey from British Non-F
Metals Research Association; Mr. J. K. Lion
National Association of Non-Ferrous Scrap
Merchants; Mr. R. A. Gentles; Mr. E. Player; Mr.
Faulkner, and Mr. D. Chapman.

After dinner the company was entertaine
Howard de Courcy (Continental magician)
Patricia Varley (soprano) and then there was d
to the music of Eddie Strevens' orchestra.

Forthcoming Events

DECEMBER 1

Association of Bronze & Brass Founders

Newcastle-on-Tyne area:—Talk on the Association's p
tion, "Costing a Casting," by Mr. W. H. Davies,
at the Union Club, Newcastle.

Institution of Plant Engineers

Peterborough branch:—"Automatic Control using Com
for Machine-tools," by M. Monk, 7.30 p.m., at the
Lion Hotel, Church Street. (Joint meeting wit
Institution of Production Engineers.)

Institution of Production Engineers

Southampton branch:—"Materials Handling," by R. G.
ton, 7.15 p.m., at the Polygon Hotel.

Leicester branch:—"Industrial Engineering—Its Scop
Opportunities," by Dr. J. E. Faraday, 7.15 p.m.,
Cromwell Room, Grand Hotel, Leicester.

DECEMBER 3

Institute of Metals

General meeting:—"Beryllium Metal: Production, Pro
and Applications," by Dr. G. A. Wolstenholme,
Department of Chemistry, The University, Wo
Road, Bristol. (Joint meeting with the Bristol sect
the Society of Chemical Industry.)

Liverpool Metallurgical Society

"Basic Aspects of Metal Fatigue," by T. Broom, 7 p.
the library of the Department of Metallurgy o
University of Liverpool, 146, Brownlow Hill, Liverp

Institution of Production Engineers

London branch:—"Maintenance of a Fleet of Vehicles
J. W. Wicks, 7 p.m., at the Royal Commonwealth So
Northumberland Avenue, W.C.2.

Reading branch:—"Quality Control," by F. Nixon, 7.30
Huntley & Palmers, Limited, Gasworks Lane.

Institution of Plant Engineers

London branch:—"An Introduction to Electronic Data
cessing," by H. A. Thomas, 7 p.m., at the Royal
tution, 21, Albemarle Street, W.1.

DECEMBER 4

Institute of British Foundrymen

Tees-side branch:—Annual reception and social evenin
the Teesdale Hall, Head Wrightson & Company, Lim
Thornaby-on-Tees.

West Wales section:—"Solidification of Cast Iron an
Effect on Soundness and Chilling Characteristics," b
Morrogh, 7 p.m., at Llanelly Technical College.

DECEMBER 5

Institute of British Foundrymen

West Riding of Yorkshire branch:—"An Introductio
Patternmaking in Plastics," by H. G. King, 6.30
at the Bradford Institute of Technology.

Wales and Monmouth branch:—"Effect of Mould Mate
on Cooling Rate and Physical Properties of Cast Met
by Mr. J. Hird, 6 p.m., at the Engineers' Insti
Cardiff.

Joint Iron Council's Report[*]

This year's report of the United Kingdom ironmaking and ironfounding industries spans the period of maximum effect of the policy of credit squeeze and the beginning of expansion resulting from new policies adopted by the Government in the autumn of 1958. Delays in effectiveness of policy changes are especially marked in the case of investment expenditure and this type of expenditure is particularly significant to ironfounders, whose most important customers are often the makers of capital equipment. While investment spending by the Government, the nationalized industries and the local authorities has risen during the first half of 1959, there is little sign yet of a rise in private industries' capital investment.

It was with deep regret that the executive committee learnt during the year under review in this report, of the death of Dr. J. E. Hurst, C.B.E., for many years associated with the work of the Council, and of Mr. W. Killingbeck, long a respected and well-liked member of the Council of Iron Producers. The difficulties with which the executive committee is faced in presenting an adequate account of the Council's work and that of its constituent members, the Council of Ironfoundry Associations and the Council of Iron Producers, are no less in respect of the financial year just ended than they have been in previous years. The tendency in compiling such a report is to confine it to those events most likely to evoke a response and to ignore the day-to-day services rendered to the industry. To compile a list of the latter would defeat the essential purpose of this report by obscuring the main issues, predominant among them being the effect on the industry of the recession.

State of Trade in the Industry

Ironfounding Production

Production during the year has been at the lowest level since 1948, and had it not been for the very good trading experienced by the automobile section the overall statistics of output would have looked even more depressing because of market weaknesses in pressure pipes, light castings and castings for the engineering industry. The total output of iron castings for the twelve months July, 1958, to June, 1959, at 3,327,000 tons, compares with 3,657,000 tons for the previous 12 months' period. The reduction (9 per cent.) is mainly attributable to weak trading in the first three quarters of the year, the final quarter's output being virtually equal to that of the corresponding quarter last year and no less than 6 per cent. above that of the previous quarter. The outstanding exception (as in the case of the motor industry itself, *vis-a-vis* industry as a whole) to the general state of recession has been the automobile section, where a record output was achieved for the year and the last three months saw the quarterly rate of output 13 per cent. higher than ever before reached.

The production of castings for domestic durable goods continued to suffer from the effects of credit restriction in the early part of the period, but with changing policies improvement came at the end of 1958 and has continued in the current year. For other light-castings makers, however, the rise in building work was not reflected in foundry activity until the end of the period. The production of castings for railway equipment has been quite sharply reduced; this is mainly to be attributed to the phasing of the modernization programme which required the main castings element—castings for the permanent way—in the earlier stages.

The new policy of encouraging local authorities to go forward with shorter-term capital schemes helped to contribute to a notable improvement in the output of pressure pipes at the end of the second quarter of 1959, while the slightly better demand for steel led to a small recovery in ingot-mould production. Both these developments were in sharp contrast with the trends visible through the previous three quarters of the period covered by this report. In the important engineering section, recession became deeper throughout these three quarters, but in the latest quarter for which figures are available in the report a recovery among makers of some types of machinery castings was apparent, though conditions for those making marine and other heavy castings for boilers and prime movers did not improve. One of the groups hardest hit by the recession has been that comprising the smaller general jobbing foundries; it is encouraging to see some improvement in trading conditions for them. The CFA carries out a quarterly enquiry into current trends in the industry. At the end of June a strong balance of opinion among firms taking part in the enquiry anticipated a continuance of recovery in the industry.

Pig-iron Production

The production of pig-iron has suffered a further decline over the period, and four companies have ceased to make it. The fall in demand was mainly the result of reduced output of castings, but was also due to an increase in the proportion of scrap being used. Foundries consumed 16-per cent. less high-phosphorus, 2-per cent. less low-phosphorus, 26-per cent. less hematite and 11-per cent. less refined iron than in the previous 12 months. Producers, however, were able to achieve an expansion in their overseas trade. Foundry and forge pig-iron exports amounted to 113,800 tons, 46-per cent. higher than in the previous twelve months. Refined-iron exports were 34-per cent. higher at 25,000 tons.

With the recovery in the foundries, their pig-iron requirements should tend to rise in the year which lies ahead, and as they are carrying only 71 per cent. of the stocks held a year ago it is doubtful if their requirements can continue to be supplemented by the drawing down of stocks.

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[*] Report covering the period July 1958 up to and including June 1959, published by permission of the JIC.

On June 1, 1959, the Iron and Steel Board issued a new Price Determination involving a revision of the foundry pig-iron related schedules. There is now a new Related Schedule No. 3 for the grades of low-phosphorus iron formerly covered by Schedules Nos. 3 and 4. Although the changes in basic prices were generally in a downward direction, some of the extra charges for special qualities were increased.

Iron and Steel Scrap

In August, 1958, the Board of Trade announced that they would be prepared to consider applications for licences to export iron and steel scrap. This decision had not been opposed by the JIC, which had asked that it should be consulted before the quotas were increased or fresh quotas granted. The limited degree of exports allowed by this measure did not appear to reduce the excess stocks of steel scrap to dimensions commensurate with home demand, and on December 5, 1958, the Board of Trade granted an Open General Licence until February 4, 1959, for the export of iron and steel scrap. The Council of Ironfoundry Associations, which accepted the existing need to reduce stocks of steel scrap, had felt obliged to oppose the further release of cast-iron scrap for export, and had represented to the Iron and Steel Board the adverse effect which this would have in the current depressed conditions of the foundry trade. It had been submitted that there was no evidence of a surplus of cast-iron scrap, and that the price of this had shown a tendency to rise as a result of the limited exports which had already taken place. It was feared, moreover, that the dissipation of scrap reserves through exports would lead to a severe shortage upon the revival of industrial activity. The Board of Trade, however, concluded that, since Customs officers would not be able to distinguish effectively between cast-iron and steel scrap, the granting of an Open General Licence for a short period was, in the circumstances, the only satisfactory way of arranging scrap exports.

In the light of this decision, the CFA in December, 1958, asked all member-firms to keep it advised of the position in their localities. The replies received indicated widespread and increasing difficulty in obtaining supplies, and, after consulting with the Council of Iron Producers to ensure that its action would not prejudice the interests of its partner in the JIC, the CFA felt in a position to represent strongly to the Iron and Steel Board in January, 1959, its view that the export of cast-iron scrap should be discontinued. The Open General Licence was in the event extended for a further month until March 7, 1959. Since the latter date, however, only the export of compressed baled material and turnings and borings has been permitted until September, 1959. Notwithstanding the welcome decision to end the general export of iron and steel scrap, the CFA felt it desirable to advise members to maintain their stocks at adequate levels. Since the end of the period under review exports of scrap have been limited for a further period of three months to those categories previously included.

Coke

The reduced activity in the industry has naturally been reflected in a lower consumption of both blast-furnace and foundry coke. Stocks of all grades of coke at the coke ovens have risen appreciably. Stocks of foundry coke at ironfoundries fell in the course of the year so that at June 30, 1959, they represented some three-and-a-half weeks' consumption. The "Sharing the Burden" Scheme for blast-furnace coke was terminated on October 31, 1958, and discussions were started between the producers and consumers on arrangements to replace the scheme. In March, 1959, a new scheme affecting composite iron and steel plants came into operation. A new scheme for independent blast furnaces will come into operation later in 1959.

Iron and Steel Board

On February 28, 1959, Sir Archibald Forbes, G.B.E., retired as chairman of the Iron and Steel Board, and was succeeded by Sir Cyril Musgrave, K.C.B.. Sir Archibald had been chairman since July 13, 1953, when the Board was set up, and the Executive Committee wish to record their thanks to him for his help and co-operation during his period of office.

The quarterly meetings with the whole-time members of the Board have continued, and there has been a close and cordial relationship between the officials of the Board and the Council. Among the matters discussed with the Board have been the implementation of the Clean Air Act, railway freight charges, research work, long term demand and raw materials, particularly iron and steel scrap. The state of trade in the industry has been regularly reviewed and the attention of the Board was drawn to the position of the Scottish ironfounding industry, which had been more severely affected by the recession than had the rest of the country. The Board has set up a Committee to enquire into home ore resources on which the CIP is represented.

Transport

On October 13, 1958, the British Transport Commission increased by 7½ per cent. the rail freight charges on iron ore, pig iron, iron and steel scrap, lime and limestone, and coal and coke when supplied to iron and steel plants, including ironfoundries and blast furnaces. No previous information of this move had been received from the Commission, but upon learning of the proposed increase, the JIC made a most vigorous protest which resulted in a delay in its introduction, and in meetings with senior members of the Commission in October, and with the chairman of the BTC in November. The BTC was, in the event, not prepared to forego the increase of 7½ per cent. in the freights of affected traffic, but expressed anxiety to negotiate mutually favourable bargains with in-

lual traders which would lead to the recovery
the railways of a larger share of outwards
luct traffic in return for lower overall freights.
:w ironfoundries and iron producers successfully
:luded agreements of this nature with the rail-
s during the course of the year, which in some
s helped to offset the 7½ per cent. The CFA
on a number of occasions reminded its member-
s of the opportunity for negotiating favourable
vidual freight bargains with the railways.
›uring the course of the year it became apparent
the facilities for land sale at certain South
les coke-ovens were causing a substantial
nge from rail to road transport in the carriage
this traffic. The Foundry Coke Merchants'
ociation subsequently persuaded the Western
ion of British Railways to offer a reduced
ght valid for one year to foundries in their area
ying 100 per cent. of their coke traffic by rail.
r, the CFA joined in these discussions, and the
stern Region has since indicated that it will be
pared to offer a reduced maximum freight valid
a period of five years to foundries which
ertake to place a substantial volume of coke on

Health and Safety

he CFA field investigation into the incidence of
umoconiosis in small foundries was successfully
ied out between September and November,
8. Forty-four foundries selected at random in
four areas, Scotland, Lancashire, the North East
st and the Midlands took part. The response
n the employees in the firms was gratifyingly
ı and 1,542 men were examined. The con-
ant reading the X-ray plates, Dr. A. I. G.
Laughlin, M.D., F.R.C.P., made a provisional
gnosis of pneumoconiosis in 68 cases. In his
iminary report in March, 1959, Dr. McLaugh-
stated that, while it was impossible at that
e to reach firm conclusions on the incidence of
umoconiosis in foundries, his general impres-
ı was that there was less severe pneumoconiosis
ı had been expected. The detailed analysis of
information obtained is progressing and, when
plete, should be of considerable help in obtain-
a closer assessment of the incidence of the
ase.

he CFA safety committee was prominently con-
ed during the year with the question of what
ice should be given to ironfoundries in the
t of the increasing difficulty of defending
umoconiosis claims. The disproportionate
den laid upon ironfounders by the relevant
visions of the Factories' Acts as interpreted in
light of recent decisions in the Courts was
esented to the Ministry of Labour, but it
ame clear that no relief would be forthcoming
n that direction. Accordingly, after due con-
ration by counsel, an important set of docu-
its was issued to all member-firms in April,
9, and to non-member-firms in May. These
uments comprised a statement of the current
tion in regard to employers' responsibilities
er the Factories' Acts and the common law, a
stionnaire designed to focus attention upon the
adequacy of dust-control measures in each foundry, a list of respirators approved for foundry work, a suggested form of model instructions for use when issuing masks to employees and, finally, a publication specially prepared by the British Cast Iron Research Association, entitled "Dust in the Ironfoundry," being a summary of background knowledge of ironfoundry pneumoconiosis and dust-control methods.

The annual report for 1957-58 referred to discussions proceeding between the CFA and the Engineering and Allied Employers' National Federation on the subject of the CFA's draft code of safe working practices for ironfoundry workers. These discussions proved inconclusive and, as a result, the safety committee directed the sub-committee which had been drawing up the code to proceed instead with the drafting of a code of safe working practices for management. Good progress has been made with this work and the main body of the document is complete. As, however, the code is to contain an outline of the principal provisions of the Factories' Acts which are of interest to ironfounders, its completion was delayed until the enactment of the Factories' Bill, 1958.

The CFA followed the progress of the Bill through both Houses of Parliament, and member-firms were kept advised of matters of interest monthly through the medium of *The C.F.A. Bulletin*. Among the provisions of the new Act which are likely to be of considerable interest to ironfounders are those relating to first-aid boxes, the supply of clean running water, reports on defective lifting machinery, protection of men working under overhead travelling cranes, maintenance of gangways free from unnecessary obstructions, securing of workplaces above 10 ft. from floor level, fire precautions, work in confined spaces, and the fencing of pits.

The work of the sub-committee of the safety committee which had been studying the requirements which foundry conditions impose upon foot and leg protective equipment bore fruit in the issue to member-firms in April, 1959, of a circular describing a recommended design for a general purpose foundry gaiter. A substantial number of foundries have since placed orders for the introduction of the gaiter into their works.

The Joint Advisory Committee on Foundry Goggles, on which the CFA is represented, has submitted a second report to HM Chief Inspector of Factories during the year. The first report had found that plastic materials as a class gave most effective protection against molten metal. The second report confirmed this finding, and expressed the conclusion that toughened and laminated glass was unsuitable for use in foundries, and that certain existing plastic materials gave a complete protection against the vigorous tests imposed. The study of suitable frames and of the opthalmological properties of selected lenses is now in hand.

The safety committee has continued to keep in touch with the health and safety sub-committee of the European Committee of Foundry Associations, which is substantially increasing the scope of its work. There has been a considerable exchange of information on foundry pneumoconiosis, and the safety committee's work on gaiter design and the studies of the Joint Advisory Committee on Foundry Goggles have been communicated to the European body.

Training and Education

The year under review has seen more public interest in training and education than in any previous year. Following the "Carr Report" in January, 1958, the Industrial Training Council, composed of employers, trade unions, the nationalized industries and some experts, was set up. The debate on youth employment problems in the House of Commons on April 29, 1959, formed the culmination of the serious concern expressed in leading articles in the national Press and reflected in questions in the House. The Duke of Edinburgh has shown great interest in apprentice training in particular, and is sponsoring a scheme for a Commonwealth Apprentice Week. The Government, while recognizing that training is a matter for industry, has for the first time taken financial steps to encourage it. A grant of £75,000 to be matched by industry is to be devoted to increasing the number of training officers in industry.

On December 1, 1958, Mr. F. C. Hayes joined the staff of the Joint Iron Council as Education and Training Officer in succession to the late J. J. Collett. After a six months interval, the training committee was thus able to resume its full range of activities and to undertake a number of new projects.

In November, 1958, the second European Foundry Apprentice Competition organized by the European Committee of Foundry Associations was held in Paris. The British team again came behind Germany and France but the third individual prize was won by a British apprentice. The next international competition is to be held in the United Kingdom in May, 1960, and preparations for it are well in hand. A committee, representing all sections of the industry, under the chairmanship of Dr. C. J. Dadswell, president of the British Steel Founders' Association, has been set up to organize the competition, and a sub-committee under Dr. J. G. Pearce, C.B.E., formerly director of the British Cast Iron Research Association, is concerned with the detailed arrangements. The training section of the Council of Ironfoundry Associations is providing the secretariat for both these committees. The British candidates for the competition are to be selected by the Institute of British Foundrymen.

The training committee's proposals for a national syllabus for the training of craft apprentices were the starting point for a scheme by which the industry should award a "Certificate of Craft Skill" to those apprentices who at the conclusion of their apprenticeship had reached a nationally recognized minimum of practical skill. Companies with "approved" training schemes would be empowered to issue certificates to their successful apprentices, others would be able to submit their apprentices to an independent test of craft skill. This recommendation was made at a very successful two-day study conference attended by members of the CFA training committee, its consultative panels and invited guests. A number of other proposals were made affecting recruitment, City and Guilds Courses and the National Foundry Craft Training Centre. Demand for places at the Centre continues to exceed the number of places available. The trustees have put forward a scheme for expansion of the facilities which it is proposed to submit to the whole industry. At the Foundry Exhibition held at Bingley Hall, Birmingham, in May, 1959, the CFA agreed to their stand being used by the National Foundry Craft Training Centre for the purpose of demonstrating actual casting. The stand drew large crowds of visitors, to whom it successfully portrayed founding as a worthwhile career.

The study conference mentioned above revealed the urgency of planning the training of foundry technicians on a national scale. The number and importance of technicians are increasing rapidly, but the wide range of their duties has not helped in arriving at clear ideas of the best methods of training them. The training committee will give serious attention to these problems during the coming year.

Three one-week residential courses for foundry supervisors have been held in the past year. A project has been introduced into the programme in which members are divided into small groups, each group acting as an advisory committee and submitting a report on some management problems—technical, labour, safety and training—arising from the reorganization of a foundry. This exercise has proved popular with the supervisors, who felt they derived great benefit from it. Two well-attended conferences on costing have also been held, one in Manchester in July, and another in London in September, 1958.

Requests are received from time to time from young foundrymen abroad who wish to undergo a period of training with a British firm. The training committee felt that it was preferable to enable these men to gain their experience in this country rather than elsewhere. A panel of some twenty companies has been formed each of which will be prepared to consider individual applications on their merits.

The governors of the National Foundry College have been considering a proposal that a new course should be introduced at a higher level than the existing diploma course, to run concurrently with it. The new course is likely to be either a three-year sandwich or a two-year full-time course leading to the equivalent of a Higher National Diploma, and if the industry so desires this might eventually develop into a four-year course leading to a Diploma in Technology. Entrance would be through "A"-level GCE or an Ordinary National Certificate. The training committee, having obtained the comments of its consultative panels, expressed its support for this venture, which would help in attracting young men of good calibre into the industry.

Two students who held a JIC scholarship for a one-year post-graduate course in Foundry Science and Engineering at the department of industrial

urgy of Birmingham University, and one
t who was engaged in post-graduate research,
all taken up appointments in the foundry
ry. Another student, who with the aid of a
rant has completed the diploma course at the
nal Foundry College, has also entered the
ry industry. The CFA training committee has
sed the IBF nomination for next year's
rship to the National Foundry College. After
consideration, the training committee has
d to reissue, with some minor alterations, the
16 instructional foundry-wall charts which are
sent out of print.

Clean Air

rather more than a year—since June 1, 1958
industry has had the positive duty of con-
g its melting and kindred processes so that
ion of the atmosphere is prevented or con-
l by suitable measures. The responsibility of
ision is divided between the local authorities
e Alkali Inspectorate. The latter has control
processes that present special technical prob-
ffecting the suppression of smoke, fume, grit
lust. The local authorities have powers of
ement and approval over the remaining pro-
. Large establishments operating scheduled
on-scheduled processes viewed with some con-
the prospect of dual supervision, and the
ry as a whole considered that more rapid
ss in the study and solution of the problems
come from collaboration with a central,
cally-experienced authority. Nevertheless the
ry has accepted the position with goodwill
he JIC, through its technical panel on clean
d by co-operation with other organizations,
ught to agree with the authorities the measures
hould be acceptable as reasonably practicable,
full regard to the present state of know-
the financial implications and the local con-
s and circumstances.

the case of pig-iron production the major
sses, including blast-furnace operation and
ng, are under the jurisdiction of the Alkali
torate. Through its representative on the
priate committee of the British Iron and Steel
ation, the JIC has had the advantage of join-
the Federation's informal discussions with
hief Alkali Inspector. The Chief Inspector
so visited several of the foundry pig-iron pro-
plants. The broad agreements which have
d from the discussions have already been
unicated to the member-firms of the CIP,
er with a valuable technical report by a work-
rty of the Federation. It is therefore un-
ary to enlarge on the details in the present
.

clean air panel has been most actively con-
l with the ironfounding processes. Its attention
rst turned to the cold-blast cupola. Early in
1958, the panel had met representatives of
tional bodies of local government in the spirit
tering collaboration and of establishing, if it
ossible, uniform principles for the treatment
d-blast cupolas. The discussion resulted in a
measure of agreement, and although this did
mmit any of the local authorities to a particular policy the publicity given to the discussion in local government circles undoubtedly gave timely and helpful guidance to the officials. A conference held jointly by the CFA and the British Cast Iron Research Association in July, 1958, provided member-firms with information on the legal aspects and technical problems of air pollution, with emphasis on the cupola; an exhibition of plant was provided by members of the Foundry Trades' Equipment and Supplies Association. In November, the Secretary of State for Scotland decided not to schedule the cold-blast cupola, so that the position in Scotland is identical with that in England and Wales. Relatively few difficulties between foundries and local authorities, either in regard to the smoke regulations or to grit and dust, have been brought to the notice of the Panel, and it is assumed that progress satisfactory to both sides has been made. The local authorities have recently been urged by the Minister of Housing and Local Government to treat the "black spots" in the country with a greater sense of urgency.

The scheduled ironfounding processes embrace air and rotary furnaces and the hot-blast cupola. The panel has held two informal discussions with the Chief Inspector in order to consider "the best practicable means" of dealing with the fume, grit and dust in hot-blast cupolas. In his report for 1958 the Chief Inspector has published his broad views on the difficulties presented by both the recuperative type and the externally-fired type. The panel sincerely trusts that the Inspectorate's requirements will not be so onerous nor so inflexible as to hinder or even prohibit the technical development of the process and its wider use in small plants, and this view has been put to the Chief Alkali Inspector. By the time this report is in the hands of member-firms a broad definition of "the best practicable means" may have been agreed and communicated to the industry. Problems that arise in the use of the rotary and air furnaces are being dealt with on an individual basis between inspector and foundry.

The Beaver committee's idea of central technical inspection and supervision has been consistently opposed by local government, and the Clean Air Bill was amended so that a local authority could ask the Minister of Housing and Local Government for an Order which would transfer the responsibility for scheduled processes in its area to the local authority. Sheffield submitted an application almost immediately, and it is known that many authorities are awaiting the decision in this case before submitting similar applications. The principles on which the Minister bases his assessment of Sheffield's claim could largely reshape the whole pattern of administration of the scheduled processes in the cradle days of clean-air legislation. The industry has therefore given the closest thought to this issue, and has rejected the proposition that metallurgical processes such as the melting of iron and steel can be supervised as if they were simple combustion processes in which the prime consideration is combustion efficiency. The Minister had not announced his decision at the end of June, although he had indicated that there was a *prima facie* case for Sheffield to be granted an Order.

Joint Iron Council's Report

Research and Development

The JIC's close working relationship with the British Cast Iron Research Association has resulted in much valuable advice being given by the staff of the BCIRA on technical matters, where they impinged on the work of the Council. Particular mention should be made of the assistance given during the course of the discussions on the implementation of the Clean Air Act.

The JIC has continued its grants to the Institute of British Foundrymen, the British Iron and Steel Research Association and the British Standards Institution. Collaboration with the British Standards Institution has also continued, especially in the preparation and the revision of Standards that deal incidentally with the properties of cast iron, or with marginal applications of iron castings. The limitations set by some of the older Standards have been outdated by post-war developments in cast iron, and as the specifications become due for revision opportunity is taken to press for a realistic amendment of the restrictions.

The advisory committee on the examination of steam boilers in industry, which is considering their design and construction, has been advised that, on the evidence of research carried out by the British Cast Iron Research Association, the present limits for the service condition of iron castings in steam engineering could be raised appreciably. The classification societies have been similarly informed.

European Committee of Foundry Associations

Representatives of the CFA attended the meetings of the European Committee at Rome in October, 1958, and at Luxemburg in April, 1959. The Light Metal Founders' Association has now taken up membership, and shares a seat on the Committee with the Association of Bronze and Brass Founders. There are therefore now four United Kingdom foundry organizations represented on the Committee, the fourth being the British Steel Founders' Association.

The different sub-committees have continued work for the most part on established lines. That concerned with health, which had originally dealt only with foundry dusts and silicosis, expanded its work during the year to include safety matters in general. A United Kingdom representative was nominated to take part in the work of the sub-committee on costing. A set of European Conditions of Sale has been drawn up and finalized.

At the Luxemburg meeting, the UK was asked to nominate a representative to attend meetings of the International Committee of Foundry Technical Associations on behalf of the European Committee. Mr. Kenneth Marshall, director of the JIC, and Mr. Robert Barber, director of the British Steel Founders' Association, will attend alternate meetings.

Possibly one of the most important developments during the year has been the setting up of a sub-committee on the Common Market and other European institutions. This sub-committee, on which the UK is represented by the director of the CFA, is carrying out a study of tariffs and other factors affecting trade between the members.

Free Trade Area and European Common Market

Following the complete breakdown of the European Free Trade Area talks, it was decided to consider the formation of a limited free trade area comprising the United Kingdom, Sweden, Norway, Denmark, Austria, Switzerland and Portugal. Progress has been swift, and it appears probable that a convention creating this limited free trade area will be signed by the end of 1959. The principal provisions are for a reduction of 20 per cent. in tariffs between members by July, 1960, and complete removal of tariffs over a period of ten years. The Government is now consulting the industry on technical matters concerned with the trading rules to be established in the area. Emphasis throughout the negotiations has been laid on the fact that the new area is designed to be a bridge to the Common Market, not a separate bloc. This point has been repeatedly stressed by the Federation of British Industries, speaking for the majority of British industries, which fully realize that association with the Common Market is a much more important goal than participation in a limited free trade area.

Since the previous Annual Report, the six countries of the European Common Market have made the first round of tariff reductions and quota increases between themselves. The immediate impact has naturally not been great, but there have been signs that Continental agencies are becoming reluctant to tie themselves exclusively to the sale of goods coming from third countries, and it appears probable that American concerns will consider setting up new plant in Common Market countries in preference to those outside.

Conditions of Sale

In accordance with the requirements of the Restrictive Trade Practices Act, the CFA Standard Conditions of Sale were registered with the Registrar of Restrictive Trading Agreements. The CFA at once asked the Registrar to apply to the Board of Trade for an order under Section 12 of the Act removing the conditions of sale from the Register as being of no substantial economic significance. The Registrar has declined to make such an application but has not yet given the reasons for this decision. On the face of it this seems a somewhat surprising attitude, since the Conditions of Sale are no more than a codification of the customs of the trade, and are not in any way comparable with the trading agreements which have already come before the Restrictive Practices Court.

Press and Publications

Since June, 1958, publicity activities (carried out under the direction of the executive committee) have included the successful issue of an Ironfounding Supplement in *The Guardian* of November 4, 1958. This attracted wide attention, and was by general consent deemed to be one of the best pieces of work ind in which the JIC has co-operated. To-e end of the year under review, work was ;o forward vigorously in preparation for a ;nt to be entitled " British Ironfounding," ıblished by *The Yorkshire Post* about the he Convention and Banquet of 1959.

ds the end of 1958, the JIC issued an illus-:ochure (to which reference was made in ;ding annual report of the executive com-vhich was calculated to inform purchasers s of iron castings of the ironfoundry pro-gnificance in the world of industry. Wide ion of this publication has been made to firms and organizations on carefully pre-ts. It has also served a useful purpose as ıda for the industry among educationists, nerous letters of appreciation have been

from these major achievements, the press lications staff have been enabled to place a ıble number of general and specialized ın the ironfounding industry in newspapers er periodicals. Assistance has, as usual, 'en in the production of editorial work d with other branches of the Council's , and also to the promoters and organizers ›undry Exhibition at Bingley Hall, Birming-ring May, 1959. In addition, the press and ons officer gave assistance and advice to ıorities of the Science Museum, South :on, on the representation of the ironfound-stry in the new Iron and Steel Gallery at eum.

ıook entitled " A Practical Guide to the ›f Grey Iron Castings " was first published :FA in June, 1956. The demand was heavy :print was made in June, 1957. Altogether ›pies have been sold or distributed and re now exhausted. The call for the book ide and outside the industry continues, and s has been assessed it is likely that a further ɔn will be ordered.

Annual Accounts

diture has been maintained at about the 'el as that of the previous year, in spite of 1 activity in certain directions and some ; in operating costs. (Copies of the balance d the revenue and expenditure account for ended June 30, 1959, were distributed to member-firms with the original Report.) On the other hand, the income has fallen considerably due to a heavy decline in receipts from the pig-iron levy. This in turn is due in the main to the decline in trade, aggravated by the increased use of scrap in place of pig-iron and a reduction in stocks of pig-iron at the foundries. The effect of this decline in income has been to reduce the advance contribution to the BCIRA for the year 1959-60 by £52,000, and to leave no surplus of income in succeeding years such as to enable further advance contributions to be made.

At the same time the size of the JIC grant to the BCIRA has assumed a new importance in relation to the Department of Scientific and Industrial Research grant arrangements for the years 1959-64, which reqüire a larger industrial income in order to qualify for the Government grant. The executive committee has informed the BCIRA that it may expect to receive a total of £110,000 for the year 1959-60, made up of the advance payment of £50,000 already paid and a further sum of £60,000 to be paid during the year, but that every effort will be made during this and succeeding years to increase the total annual contributions up to a maximum of £125,000. The executive committee feels that, while it will continue to see that expenditure is controlled within the limits of policy laid down, there is insufficient scope by reductions of expenditure to bring about a balance, and that first consideration must be given to increasing the income and the reserves of the Council.

Sir Frederick Scopes

The year 1958-59 was marked by the retirement of Sir Frederick Scopes from direct association with the work of the Council. It is fitting that a tribute should be paid in these pages to his many years of unstinting service to the iron industry. He was president of the Joint Iron Council from 1948 until the end of 1954, when he was succeeded by Mr. N. P. Newman, and was for long chairman of the JIC finance committee. He was also chairman of the Council of Iron Producers from 1948 to 1959. Sir Frederick, happily, remains in touch with the Council's affairs, and continues to take a keen and active interest in the industry as a whole. His retirement from office in the JIC was marked by presentations to him at a dinner in his honour on March 17, 1959.

ECSC Steelmakers' Record

ıble feature of the record rise of steel ouput European Coal and Steel Community in was the increase by nearly 20 per cent. in the ›roduction. Last month's figures brought out-:he first 10 months of this year to 51,800,000 ıns—6 per cent. more than the 48,842,000 tons l in the corresponding period of 1958.

: of pig-iron and ferro-alloys in October was :cord, reaching 4,381,000 tons, compared with ious record of 4,057,000 tons reached in September and 3,752,000 tons in October, 1958. Output first 10 months of the year amounted to ›0 tons—4.9 per cent. more than the 36,471,000 luced in the same period last year.

GKN in New Venture

A jointly owned British and American company has been formed to produce copper bases for transistors and other pressings, extrusions, and small parts manufactured from ferrous and non-ferrous metals. The company, to be known as Floform Parts, Limited, is privately owned, with Guest, Keen & Nettlefolds, Limited, and Steel Industries, Inc., both holding 50 per cent. of the £10,000 capital. The two directors appointed by GKN are Sir Anthony H. M. Bowlby and Mr. Claude C. C. Birch, while Mr. H. M. Oshry and Mr. H. F. Ostrom have been appointed by Steel Industries. Sir Anthony is chairman of the new company, which intends to start operations in Birmingham next year.

British Standards Institution

The November issue of *News*, published by the British Standards Institution, lists the following under "New British Standards":—

Supplement 1 : 1959 to B.S.4A : 1934 T-bars (universal, heavy-flange and long stalk) (*5s.*). Tables of dimensions and properties (moments of inertia, radii of gyration, elastic moduli and plastic moduli) are set out.

B.S.2845 : Coke-burning inset open fires without boiler and without convection. Part 2 : 1959. Performance and constructional requirements (*6s.*). Section 1 of this standard specifies the essential dimensional requirements for coke-burning inset open fires, and Section 2 the appropriate thermal requirement for fires not complying with all the dimensions specified in Part I. The methods of test to be adopted for assessment of performance of fires to this standard are described in Section 3. Fires complying with the standard may qualify for the B.S. certification mark.

B.S.3128 : 1959. Constructional and performance requirements for inset open fires with boiler and without convection (*6s.*). This specification has been prepared to cover open fires burning solid fuel, which are generally in accordance with B.S.2845, but have an integral back boiler. Minimum dimensional and constructional requirements are specified and methods of tests are defined to confirm that the appliance conforms with the specified performance requirements. Fires complying with the standard may qualify for the B.S. certification mark.

B.S.3159 : Woodworking saws for hand use. Part 1 : 1959. Hand saws (*5s.*). This standard relates to the type of differences and certain dimensional features of four classes of taper-ground and flat-ground hand saws for cutting timber. In each class saws from 18 in. to 28-in. long are available. The standard distinguishes between saws intended for ripping and those intended for cross-cutting, and covers materials, blade hardness, tooth forms, proportions and finish, marking and testing.

Under the heading "Revised British Standards" there are B.S.1016: Methods for the analysis and testing of coal and coke. Part 12: 1959, caking and swelling properties of coal (6s.); and B.S.1251: Open fireplace components. Part 2: 1959. Fireplace surrounds and hearths (3s.), and Part 3. Adjustable chimney-throat restrictors (insertible) (3s.). Draft standards which have been circulated for comment include A 1364: Simplified methods for measurement of grit and dust emission from chimneys, and A 1534: Cast-iron spigot and socket pipes (vertically cast) and spigot and socket fittings for use with pipes to B.S.78 and B.S.1211. Part I: cast-iron pipes (vertically cast) (revision of B.S.78); price to non-members of the Institution 5s. and 3s. 6d. respectively.

Copies of these standards may be obtained from the sales branch of the Institution at 2, Park Street, London, W.1. It is also reported that the Institution has received the following draft ISO recommendations: No. 292: Interrupted creep testing of steel at elevated temperatures; No. 293: Non-interrupted creep testing of steel at elevated temperatures; No. 294: Determination of proof stress and proving test for steel and elevated temperature; and No. 295: Stress rupture testing of steel at elevated temperatures.

COLVILLES, LIMITED, is to erect a 227-ft. high cooling tower at its Ravenscraig Steelworks, Motherwell *(Lanarkshire)*, at a cost of £120,500.

Film Review

Sheffield Made. A sound and colour film which is available, free of charge, from the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1; running time 15 min.

This film reports convincingly the contribution which the industry of Sheffield makes to modern progress through the production of special steels. Liquid metal is shown being made by an 80-ton arc furnace, by high-frequency induction and the vacuum-melting process. The colour used in the filming of this last item was of particularly high quality and, though the liquid steel was photographed through a window, it appeared as it does to the naked eye. The commentary is excellent, and emphasizes just those matters which need stressing, without recourse to exaggeration or undue "puffing." For foundry audiences, it is a border-line film, but it is so near, at least as far as melting is concerned, as to create a lively interest.

South African Technical Institute

Dr. Frans du Toit, chairman of Sasol (the South African Oil-from-coal Corporation) told 100 Parliamentarians and industrialists at Sasolburg, on November 11, that the Corporation was establishing a technological institute that will have far-reaching effects on the country's industrial development. The only one of its kind in Southern Africa, the Institute would give young technicians courses in chemistry and technology that would appreciably relieve the strain on the Union's limited technical labour force.

Dr. du Toit then explained that during the establishment of Sasol, a great reservoir of knowledge and experience had been built up. The coming into being of the Institute would mean that it would not be kept in cold storage but would be passed on to others for the benefit of the whole country. He said that a research station had been created, designed to improve the quality of many of South Africa's products and to investigate the manufacture of new products, and that such satisfactory progress had been made that it was felt the time had come to negotiate with the Department of Education, Arts and Science. The Institute is to have its own principal and staff and the part-time services of Sasol's experienced technicians.

Smith/Torrington Link-up

As a result of an agreement between S. Smith & Sons (England), Limited, and the Torrington Manufacturing Company of Connecticut, USA, the Smiths organization will manufacture and market Torrington air impellers throughout the world, with the exception of the Americas. The British company's products will be known as Smiths Torrington air impellers, and will be made and marketed by Smiths' recently established air-impeller department, based at the Witney subdivision of the company's motor-accessory division. The new department will provide fans for a wide variety of industrial and domestic uses, ranging from air conditioners, refrigerators and electronic cooling equipment to house warming units. Standard sizes of Smith Torrington impellers are from 1½- to 11-in. dia. for centrifugal types, and from 3- to 24-in. dia. in axial types.

PLANS HAVE BEEN approved for a sand testing laboratory at the Teesdale Works, Thornaby-on-Tees (Yorks), of Head Wrightson & Company, Limited.

Simple Geometry in the Foundry

*By M. Callaghan**

It used to be difficult to establish new ideas in the foundry or to change existing practices, especially if there seemed, on the surface, but little to be gained. Present circumstances, however, are altering that outlook and the opportunity is taken in this article of illustrating some instances where knowledge and application of simple geometry can be of advantage in marking out core-irons and other open-sand jobs where no pattern is provided, as well as in marking-off centres of bosses, facings, etc., in swept-up moulds.

Present Marking-out Practices

At present, core-irons are marked off by: (*a*) inverting the corebox on the bed. However, there are snags here, such as overlapping and perhaps crushing other imprints previously made; or "playing safe" and so wasting space which may be lost to other irons. Then, if it is a big corebox, a couple of men or even a crane may be necessary to get the box inverted on to the bed.

(*b*) Paper templates may be used. Someone is sure to have an old newspaper—or will it need two? A bit of paper can be had from the store or one of the men. Perhaps they are not wide enough so it is necessary to patch them or "sew" them together with sprigs. Finally, the template is laid on the bed, and a few weights are placed to hold it in position while the shape is being marked out. This is not a very accurate method, "but then it is only a core-iron and a few prongs can always be knocked off if the iron does not fit the corebox!" Yet there is a lot of waste—of time and material—and poor efficiency if the iron has to be broken.

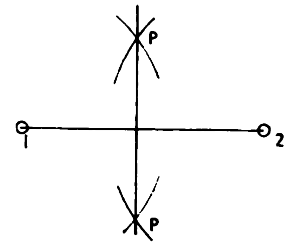
In swept-up moulds, the "rule-of-thumb" method still prevails in some foundries. In marking-off the position of bosses, etc., in this kind of mould, diameters of the bosses are often increased by a half inch or so to ensure there will be ample metal thickness when the hole is bored in the correct position, or again an angle template may be set up from the spindle.

INTRODUCTION TO GEOMETRY

Perpendiculars and Angles

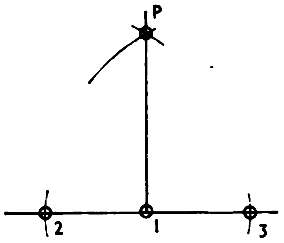
Before making particular applications it is necessary to describe some simple geometric principles. (In the following remarks and sketches, ⊕ will always denote a centre used to describe arcs; (1) will always denote the given point (if any), and (p) will always denote a point established.) The rising numbers will always denote the rotation of operations to be followed. It should be noted that the greater the distance point (p) is set, then the more accurate will be the angle. In each case, the method is made clear by reference to the appropriate sketch and the notes are intended only as amplification.

Example (1). *Bisecting a straight line:*



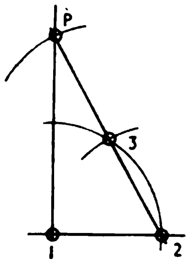
The distance set on dividers never changes in marking all four arcs, and the distance set must be greater than half the length of line, otherwise intersection of arcs is not possible.

Example (2). *Erecting a perpendicular* (*at a given point on a line*)



Cut equidistant arcs on either side of given point (1) then, using each cut (2, 3) as a centre and the dividers set to wider pitch, mark intersecting arcs at p; join p1.

Example (3). *Erecting a perpendicular* (*given point at or near the end of the line*)



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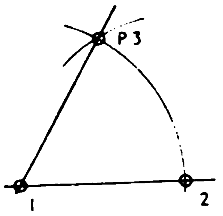
* The Author is teacher of patternmaking and foundry practice at he David Dale College, Glasgow.

Simple Geometry in the Foundry

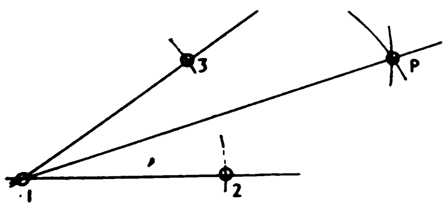
The distance set on the dividers never changes in marking off all three arcs. A straight edge is used to join up intersections 2 and 3 in order to establish p: join pa.

Example (4). *To construct an angle of 60 deg.*



It should be noted that if the dividers are set to a given pitch and a circle (or part) is drawn, then if an arc is cut on the rim of the circle, and both arcs joined to the centre used, then an angle of 60 deg. will be set up.

Example (5). *To bisect any angle*



The distance set on the dividers to mark off arcs 2 and 3 is reduced, and intersecting arcs marked off at p.

> Note:—From this example it can be seen that once an angle of 90 deg. has been made (see Examples 1-3) an angle of 45 deg., 22½ deg., etc., can be made by bisection. Also from Example 4 it should be seen that an angle of 30 deg., 15 deg., etc., can be made.

Setting up Angles

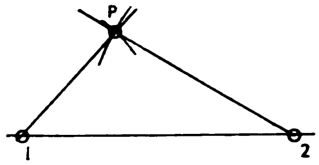
All angles cannot be made by a process of continual bisection, but can be made by chords. A chord is any straight line passing through a circle except at the centre. So, a given chord will set up a definite angle in a given circle. When the angle and diameter of circles are known (if no circle is required then one can be drawn for the purpose) the chord can be calculated. The chordal distance is then marked into the rim of circle and the ends joined to the centre to set up the angle.

In a book of Mathematical Tables there can be found usually a page headed "Chords of Angles." Opposite 60 deg. will be noticed the figure 1 (one inch). Now, to get the chord of any angle all that is required is to multiply the number opposite the angle by the radius of the circle (measured in *inches).*

Example (6). If the angle is to be 28 deg. and the circle is 22-in. dia. the chord $=0.4838 \times 11 = 5.32$ in.

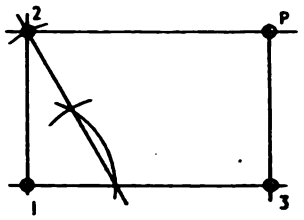
Triangles and Other Figures

Example (7). *Given the sides:*



Mark off the length of one side, then, with the dividers, set the length of each other side in turn; establish intersecting arcs at p; join 1 and 2.

Example (8). *Squares and Rectangles*
The right-angle can be marked out as shown in Example 3.

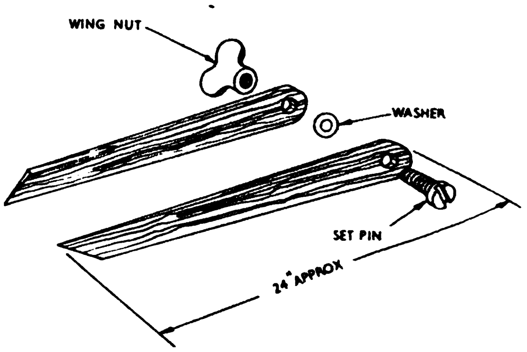


From the junction of both lines mark off the length of one side, and, from the same centre, mark off the length of the adjoining side. Maintaining dividers at the same pitch, mark off an arc from 2; then with 3 as centre and 1 to 2 as distance intersect the arc at p; join p to 2 and to 3.

TOOLS

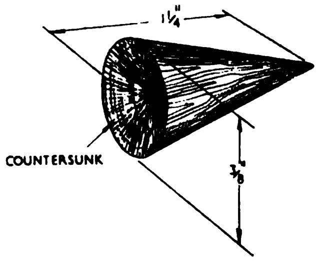
In applying the principles enunciated to foundry problems, it is necessary to use some special equipment, which can be made at very little cost in the patternshop.

Dividers (*Wooden*)



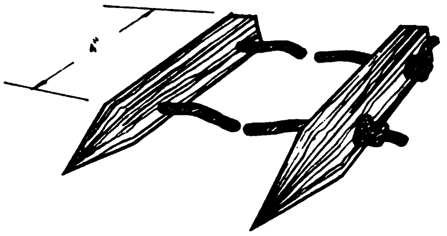
The divider legs can be made in semi-hard wood, about ½-in. thick.

Centres (Wooden)



About half a dozen of these centres can be made. They are sunk down into the sand flush with the surface at the required position, in order to establish supports for divider points.

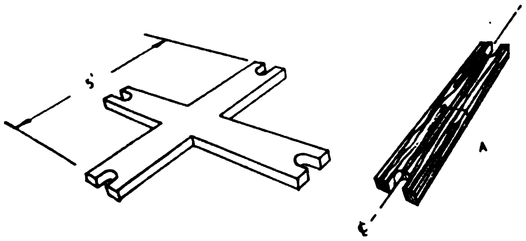
String Trammels



A length of two or three feet of strong cord is laced through two wooden pegs. These trammels are used when the distance to be marked off is beyond the capacity of dividers.

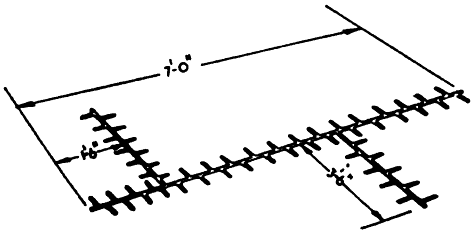
APPLICATIONS

Application of Example (1)



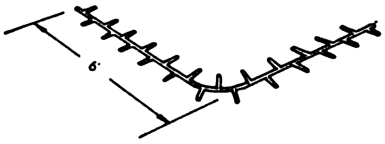
A chain-spreader casting, as shown in the sketch, is required. The pattern required need only be a single spar as shown at (a). The pattern is bedded into an open sand bed. The procedure as outlined in example (1) is carried out; the spar is then removed and rebedded along centre-lines.

Application of Example (2)



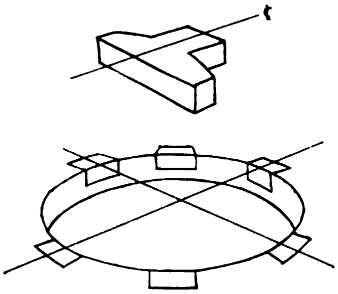
The core-iron shown in the sketch could be marked out by applying the principle outlined in example 2.

Application of Example (3)



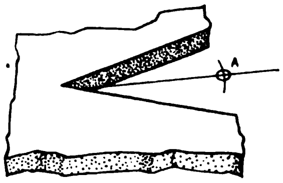
This core-iron could be marked out by applying the principle outlined in example (3).

Application of Example (4)



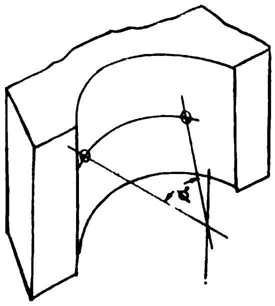
Six lugs are to be formed in a swept-up mould. For these, the centre-lines could be found by applying the principle outlined in example (4).

Application of Example (5)



A mould may be finished, but a "last-minute" alteration requires the bedding-in of a boss at A. This could be done by establishing centres in the manner outlined in example (5).

Application of Example (6)



Bosses are to be bedded into the walls of a swept-up mould. Centres established by the method outlined in example (6).

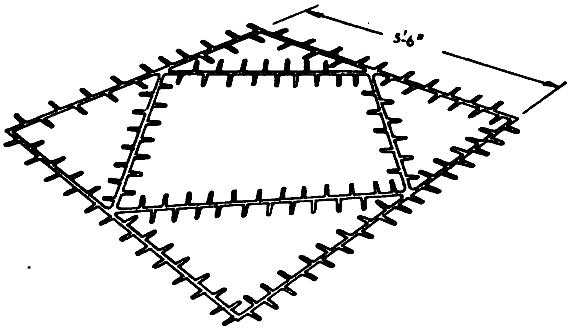
Simple Geometry in the Foundry

Application of Example (7)

A moulding box 9-ft. 6-in. long is to be lifted by slings 6-ft. 6-in. long. The maximum headroom for the crane is 20 ft. and the moulding box is 4-ft. 6-in. deep, with the lifting bars 9-in. below the top level of the box. Find the maximum headroom under load while the mould is being transported:

Subtract the distance that the lifting handles are below top level of the box from length of each sling. Draw the triangle to scale by applying the principle outlined in example (7). Measure the vertical height of the triangle and convert this to actual size. Add the depth which the moulding box is below the lifting bar and subtract the sum of both distances from 20 ft. to get the distance required.

Application of Example (8)



A large square core-iron could be marked out by applying the principle outlined in example (8).

CONCLUSION

A knowledge of simple practical geometry can be useful to practical foundrymen, yet it need not cancel out previous methods in all circumstances, to justify its purpose. The methods sketched and annotated have advantages of accuracy and greater ease of working, and employ skill instead of automatic movements, thus tending to make the work more interesting.

Raw Materials Prices

Rise of four points in the index of basic materials prices last month brought the October average to 102.4 (1954 = 100), the highest level since October, 1957. Increased costs of fuel and increases in some raw material prices have contributed to the rise, which is comparable to that which took place a year ago. October prices for non-ferrous metals held very firm.

Manufacturers' wholesale prices did not fully reflect the rise in basic materials prices, increasing by only one point last month to 111.5, about the level for the first three months of the year. There were, however, some sharp differences between industries. Some metal goods (especially cutlery, galvanized steel sheets, and high-speed steel) were all higher in price last month and there were reductions in domestic electrical appliances and other items.

High-temperature Gas-fired Furnace

At the 25th autumn research meeting of the Institution of Gas Engineers, Mr. E. A. K. Patrick, B.SC., and Mr. R. D. Hastie, presented a paper (G.C.62) on "A Recuperative Town Gas-fired Furnace for Temperatures up to 2,000 Deg. C." From their research, the authors have drawn the following conclusions:—

(1) The furnace constructed as described has successfully operated over a long period at high temperature, including several hours at 2,000 deg. C. without difficulty, and appears still to be in good condition.

(2) The recuperator has also given good service over a long period. The burning out of the hottest part of the steel tubes after nine months' use was not dicreditable, and since reconstruction of the recuperator it has given no trouble.

(3) Generous provision for waste-heat recovery has resulted in a furnace of low fuel consumption.

(4) Sintered magnesia refractories have withstood the working conditions well, but any further increase in temperature will probably compel a change of material.

(5) The use of powdered magnesia in default of an appropriate high-temperature insulating material has not given rise to as much difficulty as was expected. Although, partly owing to its having sintered, and partly to its particle-size distribution, the thermal insulation provided was not as good as was hoped, it seems very likely that, once sintering had taken place, the sintered powder was of help in keeping the inner lining in place. In saying this, it must also be said that proper care in providing support for the inner lining until sintering occurs is essential. This part of the experiment is sufficiently encouraging to suggest that, until insulating refractories become available, it may be worth while to retain the present construction, but with the use of a more closely-graded powder.

(6) The repeatability of the results indicates that reliable techniques have been developed for studying the recuperator performance, and in particular the assessment of leakage. This has been shown to be at about the minimum that can be expected of refractory construction, and to have remained reasonably steady over a considerable period. The recuperator design would, therefore, seem to be sound.

(7) Values for heat-transfer coefficients in the recuperator are presented that may be useful for future design.

(8) The use of two inwardly directed jets of preheated air in association with a refractory "Hypact" burner is a satisfactory means for attaining temperatures up to 2,000 deg. C.

(9) The weakest part of the structure was the flueway joining the furnace to the recuperator. It is hoped that this has now been put right.

Before coming to any decision concerning the future of this design of furnace, further runs at 2,000 deg. C. are required to obtain further experience at such temperatures. At this stage, the furnace should be used to assess other materials of construction, the most important being zirconia. In view of the difficulty of stabilizing zirconia properly, it is desirable that material from any source that it is proposed to use should first be examined in this respect and also subjected to the full temperature it is required to withstand. The recuperator will not need redesign unless appreciably higher temperatures are required or further use reveals unsuspected weaknesses. Further development might well lead to a more compact unit by attention to the flow patterns and the disposition of the heat-transfer surfaces.

uipment and Supplies

ansfer Medium

ıex" heat-transfer medium has been added ıge of phenol derivatives made by the heavy ıemicals division of Imperial Chemical Indus- ıited, at Billingham, Co. Durham. It is a ıixture of diphenyl oxide and diphenyl in the proportions by weight of 73.5 and 26.5 per e first heat-transfer medium of this type to be ured commercially in Britain, it offers a combination of physical properties which, it d, make it particularly suitable for liquid- ıd vapour-phase heating and cooling in a f industrial processes. It has a high boiling 5 deg. C.), low freezing point (12 deg. C.), llent thermal stability over long periods at ıres up to 400 deg. C. "Thermex" has high ısfer coefficients, particularly in the vapour urther, it is non-corrosive and presents a fire risk. At high temperatures, "Thermex" at low working pressures; for instance, at C., when steam is at a gauge pressure of ›er sq. in., the material is still in the liquid d at atmospheric pressure. So far, no specific applications for this material are mentioned, would imagine that closed cooling systems fer a likely field, and several other potential be visualized.

Sand-dryer and Cooler

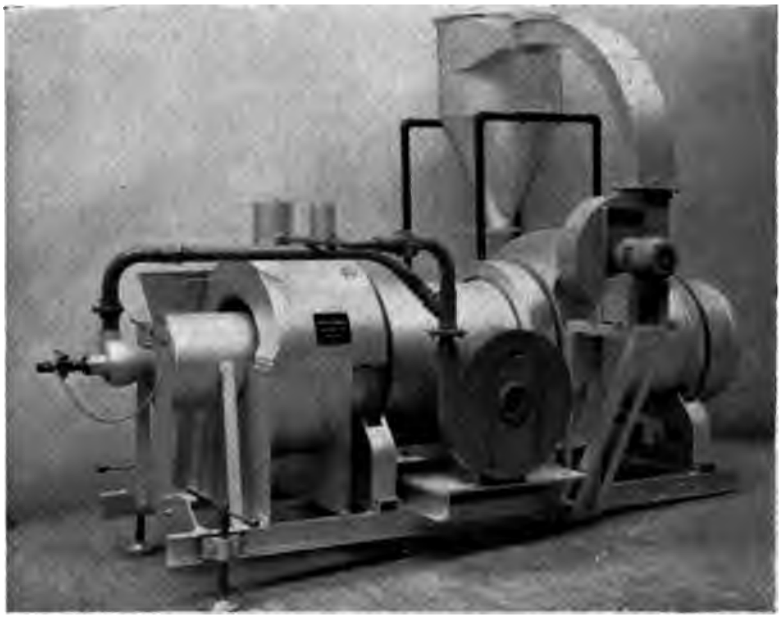
n Furnaces & Stoves, Limited, Booth Street, ırth, Birmingham, 21, have developed a com- ›tary sand-dryer and cooler which consists ıf a rotating drum which can be either gas- or Wet sand is fed into a hopper (shown at the the machine in Fig. 1), from which it is into the drying section of the drum, and ly enters the cooling end, where it cascades a stream of cold air and is finally discharged e dryer at a temperature of approximately F. The cooling air pass- ugh the last section of the ıst of necessity collect some the "fines," therefore a is included to prevent dust . This fine sand, which ›therwise be lost, is col- and makes high-quality and. The dryer is a self- d unit with its own base vhich has elevating screws ·ol the angle of flow and the sand passing through Driving gear and fans are on substantial bedplates to the main frame, mak- gid and robust structure. ıng parts are well guarded, ›vision is made for easy ınce. Collecting hoods are fitted to prevent dust and steam emission into the foundry atmosphere, and the machine can dry one ton of sand (having a moisture content of 5 per cent.) per hour. Fuel consumption is 1.3 gall. of oil, or 500 cub. ft. of gas, per ton of sand dried.

Vacuum Arc-melting Furnace

General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2, in association with Vacuum Industrial Applications, Limited, have received an order from the National Physical Laboratory for a 2-litre vacuum arc-melting furnace, to be used for melting and casting refractory metals such as titanium, niobium, molybdenum, etc. The furnace may be used for either the consumable or non-consumable electrode process. In the former case, the ingot is formed from an electrode of the parent metal which is fed progressively into a molten pool in the mould; non-consumable electrode melting is effected by using a tungsten electrode to strike the arc into which the charge is fed as small the output current to be varied from 500 to 2,000 amp. 40-v. germanium rectifier unit, the output of which is controlled by means of a saturable reactor enabling the output current to be varied from 500 to 2,000 amp. A two-stage pumping system is provided comprising an oil booster/diffusion pump backed by a rotary pump. The working chamber pressure is 0.1 microns Hg. and the pumping speed is sufficient to maintain this pressure against gas evolution from the electrode and molten pool.

Low-filtration X-ray Tube: In response to a number of requests for a low-filtration X-ray tube suitable for use with their MG 150 unit, C. H. F. Müller, Hamburg, have developed a completely new dual-focus tube and shield, rated at 150 kv., with a beryllium window. It is being marketed by Research & Control Instruments, Limited, 207, King's Cross Road, London, W.C.1, who are the sole distributors of Müller equipment in the United Kingdom.

THE 1960 DAILY MAIL IDEAL HOME EXHIBITION is to be held at Olympia from March 1 to 26.



—Combined sand-dryer ·ooler, developed by Furnaces & Stoves, , of Birmingham, with a › of one ton per hour.

American Letter

Conferences

East Coast Regional Foundry Conference

"Foundry Engineering for Quality Castings" was the theme of this year's AFS East Coast Regional Foundry Conference, which was held on November 20 and 21 in New York City. The papers presented included: "Effect of Soundness on the Mechanical Properties of Cast High-strength Steel," by H. Larson (American Brake Shoe Company); "Use of Insulators and Exothermic Compounds in Risering Steel Castings," by H. Bishop (Exomet, Inc.); "Solidification and Risering of Gray Iron," by Clyde M. Adams (Massachusetts Institute of Technology); "Economical Founding of Ductile Iron," by C. William Gilchrist (The Cooper-Bessemer Corporation); "Gating and Risering of Bronze Castings," by N. A. Birch (National Bearing Division of American Brake Shoe Company); "Recent Developments in Magnesium Foundry Practice," by J. G. House (The Dow Metal Products Company); "Requirements for Steel-moulding Sands," by B. Troy (Pennsylvania Steel Castings Company); "Mouldability of Steel Sands," by G. Watson (American Brake Shoe Company); "Gray-iron Moulding Sand," by V. Rowell (Harry W. Dietert Company); "Veining and Penetration," by G. Di Sylvestro (American Colloid Company); "Fundamentals of the CO_2-moulding Process," by F. A. Lange (Metallurgy Division, US Naval Research Laboratory); "Quality Control and Non-destructive Testing of Non-ferrous Castings," by J. W. Clarke (Erie Foundries of General Electric Company); "Carbon Additives in Steel Melting," by S. Gilbert (Petrocarb, Inc.); "Recent Advances in Steel-melting Practices," by J. Zotos (Watertown Arsenal); "Cupola Operation with a Basic Lining," by W. W. Kerlin (Meehanite Metal Corporation); "Production of Ductile Iron," by R. A. Clark (Union Carbide Metals Company); "Developments in Aluminium Alloys and Casting Practices," by F. V. Blackmun (Fabricating Division, Aluminium Company of America), and "Brass and Bronze Melting," by R. Cochran (R. Lavin & Sons, Inc.).

National Metal Congress and Exposition

The American technical associations present at the National Metal Congress, held in Chicago during the week beginning November 2, dealt with a very comprehensive programme. The following papers were of particular interest to founders. "Effect of Deformation prior to Transformation on the Mechanical Properties of 4340 Steel," by F. B. Kula and J. M. Dhosi (Watertown Arsenal, Watertown, Mass.); "Strength of Martensite formed from Cold-worked Austenite," by J. C. Shyne, V. F. Zackay and D. J. Schmatz (Ford Motor Company, Scientific Laboratory, Dearborn, Mich.); "Thermal and Electrical Conductivities of Ductile Cast-iron, and several Gray Cast-irons," by J. H. Brophy (Massachusetts Institute of Technology, Cambridge), and M. J. Sinnott (University of Michigan, Ann Arbor); "Boron in Cast Austenitic Alloys," by R. W. Kraft, Jr. (United Aircraft Corporation, East Hartford, Conn.), and R. A. Flinn (Department of Chemical and Metallurgical Engineering, University of Michigan); "Mould Material for Titanium Castings," by A. R. C. Westwood (RIAS); "Vacuum-arc Melting and Casting of Titanium," by B. W. Huber and E. J. Chapin (US Naval Research Laboratory); "Mechanical Properties of Tungsten," by E. L. Harmon (Union Carbide Metals Company); "Properties of Slip-cast Tungsten," by G. Reinhardt and F. R. Charvat (Union Carbide Metals Company); "Melting and Casting of Zinc at Trail, B.C.", by J. M. Buchanan (Consolidated Mining & Smelting Company of Canada, Limited); "Current Practices in the Melting and Casting of Copper Alloys," by P. H. Kirby (American Brass Company); "Melting and Casting Nickel Alloys," by C. G. Bieber (International Nickel Company); "Gas, and its Control in the Casting of Aluminium," by Donald LaVelle (American Smelting & Refining Company); "Factors affecting the Structure of Continuously-cast Slabs of Aluminium," by Dieter Altenpohl (Aluminium Foils, Incorporated); "Vacuum Induction-melting of Mg-Li Alloys," by R. J. Jackson, T. G. Byrer and P. D. Frost (Battelle Memorial Institute); "Effect of Production Variables on the Quality of Light-alloy Castings," by J. W. Meier (Department of Mines and Technical Surveys, Ottawa, Canada); "Factors influencing Grain-refinement in Non-ferrous Alloys," by Walter Showak (Ford Motor Company); "Cold-mould Induction-furnace for melting Reactive Metals without Contamination," by G. H. Schippereit and A. F. Leatherman (Battelle Memorial Institute) and D. Evers (Mallory-Sharon Metals Corporation), and "Continuous converting of Cupola Iron into Steel by Oxygen Blow," by W. F. Hinkle (Acme Steel Company).

Purdue Metals Castings Conference

Ferrous and non-ferrous section meetings, general sessions and a panel discussion were included in the programme of the Purdue Metals Castings Conference this year. The conference was held from October 29 to 30 at Purdue University, Lafayette, Ind., and was sponsored by the AFS Central Indiana and Michiana chapters, and Purdue University. The programme included: "Practical Application of the CO_2 Process," by W. E. Jones (Lester B. Knight Company, Chicago); "Melting of Copper-base Alloys," by F. L. Riddell (H. Kramer & Company, Chicago); "Carbon Control in Acid Cupola Operation," by W. Levi (consultant, Radford, Va.); "Gas, and its Control in Cast Aluminium Alloys," by D. L. LaVelle (American Smelting and Refining Company, N.J.); "Metallurgy of Malleable Iron," by F. B. Rote (Albion Malleable Iron Company, Mich.); "Cast Aluminium in the Automotive Industry," by R. F. Thomson (General Motors, Detroit), and "Shell Cores," by Robert Andrews (Demmler Manufacturing Company, Ill.).

New England Regional Foundry Conference

New England foundrymen held their annual foundry conference from October 16 to 17 in Kresge Auditorium, Massachussets Institute of Technology, Cambridge, Mass. General sessions as well as ferrous and non-ferrous meetings were held. Papers of particular interest were: "Nickel and the Non-ferrous Metals," by G. L. Lee (International Nickel Company of New York), "S-g Iron—Production and Control Techniques," by Harvey E. Henderson (Lynchburg Foundry Company, Va.); "Occupational Diseases in Foundrymen," by H. J. Weber (AFS director of safety, hygiene and air pollution control programme); "Methods of Melting," by Fred. C. Barbour (Republic Steel Corporation, Cleveland), "Aluminium Casting Quality Control," by D. L. LaVelle (American Smelting and Refining Company, South Plainfield, Mass.); "Alloys in the Small Iron Foundry," by D. Matter (Ohio Ferro Alloys Corporation, Canton, Ohio), "Properties of Aluminium-bronze and Aluminium Manganese-bronze," by Raymond D. Turner (Electric Boat Division, General Dynamics Corporation, Groton, Conn.), and "Gating and Risering of Ferrous Castings," by J. F. Wallace (Case Institute of Technology, Cleveland).

ıminium Enamelling*

By C. Vickers, A.M.I.E.E., A.M.I.Mech.E.

General comments on the vitreous enamelling of aluminium are followed by an account of the set-up at the author's firm. The final section of the article is devoted to the special techniques which are used when enamelling various kinds of castings.

uilding industry in England is showing the
interest in vitreous-enamelled aluminium.
ds for colour, durability, ease of erection,
ıeasure of flexibility in using and fixing,
met by the material. The only drawback
ıg immediate use is the fact that only
itates experience and findings are available
g production methods, etc.

Advantages over Steel

us-enamelled aluminium has advantages
:l in many respects. There are many appli-
n which the price difference is insignificant
is remembered that often aluminium can be
ılly enamelled in much thinner sheets than
se with steel. Furthermore, if the enamel
gged off (it does not chip if properly put
metal so exposed does not rust.

us-enamelled aluminium is easy to put up
down, and is not so prone to damage in
r on site as steel is. Its greatest blessing is
:an be finally adjusted on site if need be,
the extent of drilling, bending or cutting it,
ıing holes in it for fixing.

Previous Work

first be made clear that it *is* vitreous enamel,
ıpplied and fused to aluminium in much
e way as its steel counterpart. Although
l temperatures differ they are nevertheless
t paints stoved on to the metal. One can
ımething from the tribulations of others,
:h of what is known by American enamellers
n condensed into reports by the Porcelain
Institute. Reference to these reports shows
:echniques and frit types in use, which seem
ve themselves into lead-based and lead-free
Iowever, the method of applying the re-
enamel is generally accepted as being by
ın.

IENCE AT THE AUTHOR'S COMPANY

proposed to discuss the experience of the
company in operating one process, on the
:ion that it will be of general interest, whilst
:ts can make their own comparisons, favour-
otherwise. Some inconvenience is avoided
an do without leaded frits, and the purpose
paper is to record experiences using the
e-type enamel, with which the end result is a
in no way inferior. In many respects, however, all processes are similar. Materials and pre-treatment differ, but all of them lead to the fusing of a ceramic coating on to an aluminium or aluminium-alloy surface. The process differs from the steel enamelling process in that temperatures are lower, and there is no drying stage. In the system used by the author's company there is no ground coat, as such. As with steel, however, a coat of enamel on the reverse side is necessary on all except the thickest materials to avoid distortion, but this can be one compounded of overspray materials.

Material Costs

At the present time frits cost approximately 6s. per lb., which results in a high enamel cost. There is, therefore, some resistance on the part of the architects to specify enamelled aluminium on run-of-the-mill jobs. There are indications, however, that this position may change as more manufacturers develop suitable frits.

Pre-treatment

One of the prime essentials is to have good clean metal, pre-treated chemically in order to provide a coat to which the enamel will adhere. Surface blemishes and scratches must be avoided or removed beforehand, as the enamel, though opaque, is thinly applied. From the various pre-treatments available, developments have been made along the caustic-soda/nitric-acid cycle, in which the caustic soda serves the dual rôle of degreaser and etchant. After rinsing, the material is immersed in nitric acid for smut removal, *i.e.*, removal of the metallic radicals which are insoluble in the caustic soda. The nitric acid also commences the build-up of the oxide film on the material. A sound, impervious oxide film is essential for good enamellability so that in addition to the chemical pre-treatment, the final thickness development and sealing of the oxide film is achieved by pre-firing the material. At this stage it can be considered that the sheet is ready for enamelling. One *can* secure a fairly satisfactory bond of enamel on the metal by omitting the chemical pre-treatment, and simply degreasing before pre-firing, but, for a good durable job, this practice is not recommended.

Enamelling

The enamel is sprayed on to the work in a light even coat—mechanically or manually according to the nature of the job. The 0.003-in. thickness of the enamel does not leave much room for covering blemishes, even if second coats and firings can be tolerated. The enameller's aim, therefore,

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a paper presented at a Midland section meeting of
ıte of Vitreous Enamellers. The Author is an execu-
rnest Stevens, Limited, of Staffs.

is to get the coat on right first time. Assuming that the enamel has been successfully applied. the work is then ready for the furnace. and the stage of fusing the enamel has been reached. The temperature must be uniform over the whole area of the work at a figure around 540 deg. C.. and the enamel should not be dried before fusing (leaving it to dry indefinitely is. in fact. detrimental. Temperature control is critical. A relatively small sheet of say 4 by 2 ft. can be two different shades in its own length if this is not attended to. With regard to the furnace. one does not put down several different types but tries to equip oneself with plant which will satisfy the majority of needs in one form or another. Basically. the requirements are:

(1) Adequate size to cope with architectural work if this is to be handled:

(2) rigid temperature control throughout to ensure uniformity of colour:

(3) ability to retain flatness of the work in a variety of gauges of material to be processed:

(4) continuous operation if large batches of work are contemplated. and

(5) clean atmosphere within the furnace.

Perhaps the most important choice facing one is whether the material should be fused in the horizontal or vertical plane. The author's company came to the conclusion that its intention to cater for maximum sizes. and the widest choice of gauges and alloy. would best be served by a horizontal furnace 20-ft. long. capable of dealing with 4-ft. 6-in. wide sheets (possibly 5-ft. wide under certain circumstances). The furnace used is electrically heated. taking 250 kw.. and there are ceiling fans for circulation of the atmosphere to give temperature uniformity. Sheet enamelling is not limited to flat sheets. There are available. as standard products, a number of troughed or corrugated types used in proprietary systems of cladding. Some architects design their own form of troughing and even these can be treated by vitreous enamelling. The main reservation is that the radius at each turn of the metal should be as generous as possible and preferably not less than ¼ in., so that there are no sharp outside corners. on to which enamel does not adhere well. or sharp inside bends. into which enamel will drain and crawl in fusing. Sheet enamelling is relatively simple when the techniques have been mastered. and the correct material selected.

Special Treatment for Castings

One form of aluminium which will offer a good market. when users have appreciated the advantages of enamelling it. is that of castings. Castings come in three main types which are well known and recognized for their respective merits: (1) Sand castings; (2) gravity-die or permanent-mould castings, and (3) pressure-die-castings.

Pressure-die- and Sand-castings

Pressure-die-castings do not enamel at all successfully. Briefly, it seems that the gases compressed within the castings by the injection of the molten metal into the die simply become released during the fusing of the enamel at the surface. with the obvious result. This is not to say that it will never be possible to enamel these castings. As always. efforts continue until success comes but. so far. there is nothing encouraging to report. Sand castings are much more satisfactory. providing there are no unsuspected blow-holes. and that there is nothing in the alloy which is detrimental. The surface of a sand casting. however. is somewhat inferior to that of a die-casting and this is. of course. discernible in the enamelled article unless some careful fettling and dressing is carried out. The same pre-treatment and spraying techniques apply as to sheet and. because the casting is made in sand. it is unlikely that there will be any sharp corners. which is all to the good. The same cannot necessarily be said of gravity-die-castings.

Gravity-die-castings

Foundrymen. of course. do not like sharp corners any more than they care for differences in section thickness. and these features are equally despised by enamellers for all the reasons which have been touched upon already. Gravity castings present a good surface upon which to enamel. and slight imperfections in casting can often be attended to. Providing it is known first that a casting is going to be enamelled. and all the undesirable features are eliminated at the design stage. there is little cause for apprehension. The design stage. however. includes the choice of alloy too. and this is most important. Magnesium is a danger. and copper is doubtful. so that useful alloys such as LM.2 and LM.4 are more difficult to the enameller than LM.6. which is a good friend to all concerned.

Careful Design is Essential

To achieve the best results it is necessary to be able to discuss with the user. before ever the castings are produced. their purpose and specifications. Some loss of strength should be anticipated and. for load-bearing castings, re-design may be desirable. Some very good enamelled castings can now be produced. but one must not expect to be able to pick up any old section and expect it to work first time by conventional methods. without an element of luck. As to the economics of enamelling. the position differs appreciably from sheet. As already mentioned. there is no drying process involved in enamelling aluminium. To some extent. drying in air can be permitted. but the castings should not be allowed to dry fully. It is necessary to get the work into the furnace a short time after spraying. One does not get the opportunity. therefore. of accumulating a batch of work to introduce into the furnace at one time. unless a number of sprayers operate simultaneously, so that it is really desirable to have a continuous furnace horizontally disposed. for the lengths involved. and of quite small dimensions in terms of width and height.

Vacuum Die-casting

There is a fourth method of casting which is as yet in its infancy, namely vacuum die-casting. This is in effect similar to a pressure casting. with the obvious difference that the metal is introduced into e by evacuating the die cavity, rather than by ng the metal into it under pressure. The : of evacuating the die should theoretically :t the gases in the metal which are thought ıse failure in enamelling such castings. This so, there should be every chance of success, ı superior finish to either enamelled gravity- ır sand-castings.

ȩ Jigs

tings in aluminium are enamelled at similar ratures to those of other forms of the metal. namel itself might conceivably be adjusted to t a few degrees below the normal 540 deg. C. me low-melting-point alloys, but there is little le. At such temperatures the castings are very he plastic state and some care, therefore, needs taken in supporting them in the furnace. As d finish may be desired in just that place it would be convenient to support, it can n that fusing jigs may be necessary in certain Generally, however, this should not be a :m and, in any case, it would presumably be ı in the design stage that enamelling was in- l, so that proper care could be taken with ıch feature.

CONCLUSION

all the forms of semi-finished aluminium, gs have figured least in the work put in to 'e the enamelling of them, simply because less st has been evinced by potential users. There good reason why this should be so, as there ımerous uses to which castings are put which benefit by this superior finish, and one must e that an awakening to the possibilities is ue.

the conclusion of this paper some architectural ıtions of vitreous enamel were illustrated, start- th the subject in general and proceeding to the f aluminium in particular. Inevitably, these les were from the United States of America as, as is known, no aluminium applications have ɔublished in this country, although it has been ɛd that two such jobs exist, and that there will / be more by reason of current production. There ı further number of specimens of the finish in s forms available for inspection, whereby the ce were able to obtain a better appreciation of :ould be done.)

UNDRIES—LOOKING INTO THE FUTURE" will be eme of a meeting of the Manchester and District :tivity Association to be held at the Lesser Free Hall, Manchester, on December 8. Mr. J. W. m (John Gardom & Company) is to be the ıan. Mr. J. Banks (general secretary of the ;amated Moulders & Kindred Industries Union), .. Kirkham (past-president, Lancashire branch of stitute of British Foundrymen), and the speakers, E. H. Beech (Metropolitan-Vickers Electrical ıny, Limited) and Mr. R. Tully-Turner (Urwick, : Partners, Limited) will complete the panel for ıeeting. Mr. Beech's subject will be "Future Jobbing Foundry if it is to remain Competitive ɛe New Foundry Processes—Shell Moulding, and Investment K," whilst Mr. Tully-Turner ɔeak on "Management Organization and Work- as applied to the Foundry Industry." The ıg will commence at 7 p.m.

Industrial Expansion in Scotland

From Scotland come reports of expansion and development of new factories in various parts of the country. A new American factory is to be built in the Fife town of Glenrothes; a big Glasgow engineering works is to move its plant outside the city in the overspill plan; agreement has been reached on the manufacture of motor-car bodies at Linwood; and a site is being sought at Arbroath for a container manufacturing plant.

The US firm of Hughes International are to build a 20,000 sq. ft. factory in Glenrothes for the production of small components for industry and transistors for the rocket research programme. More than 100 workers will be producing by September next year. Within three years another factory of the same size will be built and the number of employees will rise to 500. It is anticipated that in ten years 2,000 people will be employed. The parent company, Hughes Aircraft Company, is the largest producer of military electronic devices in the US. For this, the company's first overseas venture, £100,000 will be invested initially for plant and installation.

The structural engineering firm of Frederick Braby & Company, Limited, which employs 1,100 workers at Springburn, plans to move out of Glasgow to Kirkintilloch within the next two years under an overspill agreement. The Glasgow Corporation Planning Committee has recommended that the factory site, extending to 25½ acres, be acquired under the agreement at a price of £576,000.

Agreement has also been reached on levels of earnings and conditions of employment for workers who will be engaged in the production of bodies for the Swedish Volvo motor-car at the factory of the Pressed Steel Company, Limited, at Linwood, near Paisley. A small amount of production of car-body parts has been undertaken at the factory at different times, although it has been almost entirely devoted to the production of rolling stock for British Railways and for export. It is hoped to build up this work at Linwood gradually and also introduce the manufacture of British car bodies.

Finally, the £60,000,000 Metal Box Company, makers of food cans, cartons and other forms of container, are negotiating for the purchase of land at Arbroath (Angus) to establish a manufacturing plant there.

Work-sharing at Beardmore's

A work-sharing scheme to reduce redundancy in the foundry department at Parkhead Forge, Glasgow, has been announced following a series of meetings between the management of Wm. Beardmore & Company, Limited, and the Foundry Workers' Union. About 240 foundrymen at the works, who were on strike for seven weeks on a redundancy issue, went back to work so that proposals to deal with a reduction of work could be discussed, it will be recalled.

Mr. Robert Garland, national organizer of the Foundry Workers' Union, said: "There has been an amicable settlement and the management will operate a work-sharing system so far as practicable." Problems arising from redundancy in the Scottish founding industry, affected by a drop in engineering and shipbuilding production, have also been discussed in Glasgow.

TWO IRONFOUNDING COMPANIES in Leeds—Frederick Dyson & Sons, Limited, and the Ellerby Foundry Company, Limited—have been elected members of the Leeds Chamber of Commerce.

Law Cases

Inexperienced Crane-driver blamed

At Chester Assizes Mr. Justice Davies awarded a widow, Mrs. Lilian Jennings, £4,000 damages and costs in respect of her husband's death in an accident at the Hawarden Bridge steelworks of John Summers & Sons, Limited, Shotton (Ches). It was stated that Mr. John Henry Jennings (48), when employed as a manganese crusher chargehand, was struck by a scrapbox.

The judge said that it was alleged that the crane-driver involved was negligent in raising the box without ensuring that Mr. Jennings was in a place of safety. It was obvious that when the scrapbox was lifted there would be a tendency for it to swing towards the lighter end. The manner of the hoist was such that if Mr. Jennings had not been there the box would have struck the truck behind him and this showed an unskilful and negligent operation of the crane.

The crane-driver was "inexperienced." He had no proper tuition and had never seen any senior crane-drivers doing the job. All he had done was to watch some of the spare crane-drivers. "The reason this accident happened was that the crane-driver acted too quickly before Mr. Jennings had time to get clear," the judge said. A stay of execution of 21 days was granted.

Goggles were Unsuitable

Goggles issued to an employee of the Beeston Boiler Company, Limited, Beeston (Notts), were criticized in an action for damages brought by Mr. Talwan Singh at Nottingham County Court. It was stated that the goggles issued to Mr. Singh in the fettling shop were unsuitable and the company therefore had been negligent.

Mr. Singh was hit in the eye by a small piece of metal while working as a grinder in January, 1957. He was awarded £50 damages and £35 12s. 9d. special damages. The deputy judge, Mr. T. R. Heald, said he was satisfied that there was a gap, about 1 in. wide, underneath the eyepiece of the goggles. Since the accident the company had ceased issuing that type of goggles.

Metal Spillage due to Faulty Ladle

£1,150 agreed damages were awarded at Nottingham Assizes on November 13, to Mr. Andrew Daykin in respect of injuries received in an accident at Stanton Ironworks Company, Limited, near Nottingham, in 1957. It was said that molten metal which spilled from a ladle when a wheel holding it in position came off, caused Mr. Daykin's clothes to catch fire with the result that his back was badly burned. He has since had to undergo four skin-grafting operations.

FTE&SA: Alteration of Date: The Foundry Trades Equipment and Supplies Association announces that it has been deemed desirable to change the date of the annual dinner from February 24 to March 2, 1960. The venue—the Savoy Hotel, London—is unchanged.

LAST MONTH, the new research laboratories of the Cambridge Instrument Company, Limited, Cambridge, were opened by the Rt. Hon. the Lord Adrian, O.M., M.A., M.D., F.R.C.P., F.R.S. The main laboratory block consists of four floors about 100-ft. long and 40-ft. wide. Each floor has a separate function and the experimental or working area of each is laid out in an "open-vista" plan.

Lang/Gisholt Agreement

An agreement between the Johnstone (Renfrewshire) firm of John Lang & Sons, Limited, and a large American undertaking promises a progressive expansion in machine-tool manufacture locally and increased employment for West of Scotland workers. The Johnstone factory will be occupied by a new joint manufacturing undertaking formed in association with the Gisholt Machine Company of Wisconsin, USA. The new concern, the Lang Gisholt Machine Company, Limited, will continue the manufacture of Lang machine-tools and production of the Gisholt range will be introduced on a steadily expanding basis. The markets which it is hoped to develop in the first interest are those of the Outer Seven countries. Efforts will be made later to enter other fields.

The directors of the new joint company will be Mr. G. H. Johnson (president of the Gisholt Company, USA), chairman; Mr. J. T. Lang (chairman, John Lang & Sons), managing director; Lt.-Comm. J. H. M. G. Lang, R.N. (retd.) (works manager, John Lang & Sons), Mr. J. S. Lang (engineering director, John Lang & Sons), Mr. H. S. Johnston (director of the Gisholt Company), and Mr. C. W. Hayden.

Mr. Hayden is a director of Gisholt (Great Britain) Limited, for whom production of Gisholt machine-tools will be undertaken and whose selling agents in the UK are Burton, Griffiths & Company, Limited, and Gaston E. Marbaix, Limited. John Lang & Sons, Limited, will continue to be represented at home and overseas by Associated British Machine Tool Makers, Limited, and will continue gear-cutting for the trade.

Clean Air Act Protest

Four Sheffield clergymen have protested to their Members of Parliament about what they regard as a "gross injustice" in the working of the Clean Air Act. They state, "We congratulate you and your colleagues on the vigour with which Sheffield seeks to apply the Act. There is, however, a gross injustice in its reasonable and natural application. Citizens who are compelled to live in the near neighbourhood of heavy industries, however keen they may be to play their part in reducing domestic pollution, cannot claim grants. Surely it should be a matter of conscience and of common decency to provide relief where the need is greatest. The Act should be amended by the introduction of a fresh clause." Making the point that it is unfair that grants of money to householders who instal smokeless stoves should be restricted to smoke-control areas, they say, "It would seem that those who suffer most severely from polluted air will be the last to benefit under the Act." The clergymen all have responsibility in the industrial areas of Sheffield.

Recent Wills

HITCHINS, COL. C. F., DSO, formerly of Hitchins, Jervis & Partners, chartered consulting engineers, of London, S.W.1, and had been chairman of Conex-Terna, Limited, brassfounders, etc., of Tipton (Staffs), Follsain-Wycliffe Foundries, Limited, Lutterworth, near Rugby, Varatio-Strateline Gears, Limited, Slough (Bucks), and Sanbra, Limited, brassfounders, etc., of Birmingham, and a director of K & L Steelfounders & Engineers, Limited, Letchworth (Herts)	£45,8
DEACON, L. G., a director and secretary of the Frodair Iron & Steel Company, Limited, London, E.C.3, Kittel & Company, Limited, iron and steel merchants and exporters, of London, E.C.3, and other companies	£7,8

Notes from the Branches

Lancashire

:re was a good attendance of members when Mr. illiams presented a paper on "Light-alloy Cast- to the November meeting of the Lancashire h of the Institute of British Foundrymen. In aper, Mr. Williams stressed the importance of g attention to detail, especially in the small day- / problems which arose when producing light- castings; a series of slides were used to illus- the paper.

discussion followed the lecture, and on being about chills, Mr. Williams said that cast-iron, nium and brass were used, and of these alu- m was effective on thin castings but was liable to ınd cause blowing on heavy sections; brass chills costly; cast-iron was cheaper and was easily :rable. The coating for chills could be red or a mixture of paraffin and machine oil with a g of French chalk. Replying to another mem- vho wanted to know why English founders red chills, whilst those in America preferred rs to ensure sound castings, the author said that ıgh headers allowed a cruder runner system to be they could cause grain-growth, and involved removal costs. Chills, however, gave progressive ication and a closer-grained casting. Dealing questions about pouring temperature and the ; used, he said that variation in pouring tem- ıre was not too important, except for heavy ns where if the feeder froze, piping would In the furnace, a 20 deg. superheat was :d, but pouring temperature should be as low ssible. As to the metals, he said he would like : cheaper ones, and that he thought that research he thermal history of metals would reveal how gas could be tolerated in a metal. The next on was to do with exothermic sleeves, and these, Villiams said, did not usually offset the cost of ıetal saved, but were used where fettling was lt. To another member who asked if the areas ter plates were related to runner areas, Mr. ms replied that plates were used solely to ensure ›oth entry of metal into the mould. He went › say that he preferred top running—careful on to the metal rate of entry being important :vent turbulence. Very thin castings were diffi- ɔ produce, he said, except in magnesium alloys ough suitable dressings would help here. With to cores, CO_2 cores had a chilling effect which ıot noticed when using oil-bonded cores. The moulding boxes were fabricated and the smaller were of cast-iron; the sand used was a natural- d one.

meeting closed with a vote of thanks being sed by the chairman, Mr. C. M. G. Wallwork, . Williams for his very interesting paper.

London

annual dinner/dance of the London branch ›vember 20 attracted an attendance of about 300 ers, their ladies, and guests. It was held in the Royal, in Regent Street, with Mr. John Bain, ıECH.E., in the chair. Accompanying the presi- t the top table, in addition to his personal guests ·ominent members of the branch, were Mr. C. H. ı (national president of the Institute), and Mrs. ı. Also amongst the gathering were the secre- of the Birmingham and the East Midlands branches of the Institute (with their ladies) and the national secretary, Mr. George Lambert. This function is traditionally known as the London IBF "ladies' night" and hence, there was a minimum of speech-making. After the "Loyal Toast," Mr. Wilson proposed the other toast of the evening, that of the London branch, and coupled with it a welcome to the ladies. The branch president (Mr. Bain) made a suitable reply in a light-hearted vein as befitted the occasion and the rest of the evening was given over to dancing and light entertainment. A programme by the Valli Trio and a roller-skating act by The Royals formed an agreeable contrast of fine singing and rock'n roll on skates at cabaret time. Dancing, with Ken Kenyon as compére, carried the function to its close at midnight. The general organization was in the hands of the branch social secretary, Mr. W. R. Buxton, assisted by Mr. L. A. S. Harbourne, in charge of stewards, etc.

Mineral Separation's interest in Foundry Services, Limited

An interim of 4d. a 5s. stock unit is announced by Minerals Separation, Limited, London, E.C.4, on the capital as increased by a three-for-22 rights issue and a three-for-five scrip issue, against 6d. a unit on the old capital.

The company has purchased a further interest in the Foundry Services, Limited, Birmingham, group, comprising 20 per cent. of the issued capital of Foundry Services (Holdings), Limited, and other direct holdings in its subsidiaries.

As part of the arrangement, it has been agreed that the pooling agreement, under which profits of the UK business of Foundry Services were pooled and divided equally between Foundry Services and the company, shall be terminated on December 31, 1959. The effect is that proportion of profits of Foundry Services group accruing to the company remains virtually unchanged.

Changes of Name

Among companies which have recently changed their names are those listed below. The new titles are given in parentheses.

Aerex, Limited, 220-238, West Street, Sheffield, 1 (Metal Investments, Limited).

Welding Supplies, Limited, Beechings Way, Gillingham, Kent (Esab, Limited).

Alfred Knipton, Limited, Moorgate Hall, Moorgate, London, E.C.2 (W.M.S. (Engineers), Limited).

Presha Generators, Limited, Church Street, Warrington, Lancs (Virmec Equipment, Limited).

J. & E. Hall (Engineers), Limited, 10, St. Swithins Lane, London, E.C.4 (J. & E. Hall, Limited).

Cecil S. Taylor, Limited, 45, Nottingham Place, London, W.1 (Pressings & Stampings, Limited).

Pressings & Stampings, Limited, 12a, Maddox Street, London, W.1 (P. & S. (Holdings), Limited).

Davy & United Engineering Company, Limited, Darnall Works, Sheffield 9 (Davy-United, Limited).

Follsain-Wycliffe Foundries, Limited, Wycliffe Works, Lutterworth, near Rugby (Follsain, Limited).

Dean & Lowe, Limited, engineers, etc., of Lowe Street, Stoke-on-Trent (D. & L. (Investments), Limited).

London Spring & Fibre Company, Limited, Gillett Street, London, N.16 (London Spring Company, Limited).

Britannia Iron & Steel Works, Limited, 1, Kempston Road, Bedford (George Fischer (Great Britain), Limited).

Scrappers, Limited, scrap merchants, etc., of Renwick Road, Barking, Essex (Dominion Sales (London), Limited).

E. Kempster and Sons, Limited, brassfounders, of George Street, Bury (Lancs), are the recipients of one of the awards made by the British Safety Council for accident records below the national average.

News in Brief

THE NATIONAL INSTITUTE OF INDUSTRIAL PSYCHOLOGY, 14, Welbeck Street, London, W.1, has issued a five-page booklet setting out and explaining the various courses to be held during the first three months of next year.

THE FALKIRK IRON COMPANY, LIMITED, has despatched the first of three loads of catering machinery made for the kitchen and cafeteria installation at the new permanent headquarters of NATO at Port Dauphine, Paris.

Mr. FRANK A. HURST, chairman and managing director of the Star Aluminium Company, Limited, Wolverhampton, on November 18, presented clocks and watches to 21 employees who have completed 25 years' service with the firm.

"THERE ARE A NUMBER OF THINGS going on here which trade rivals of this country would be very interested to see," said Lord Hailsham, Minister of Science, when he visited Birmingham on November 18, for a four-hour tour of the College of Technology.

AS A RESULT of the increase in sales of Sofono all-night burning solid-fuel fires (introduced 13 years ago by the Grange-Camelon Iron Company, Limited, a member of the Federated Foundries group), a new division at Falkirk -Sofono electrical division—has been formed, with Mr. D. Barker as sales manager.

AEI LAMP AND LIGHTING COMPANY, LIMITED, has been appointed official lighting consultants for Isora ceilings which were introduced to this country at the Building Exhibition. AEI plan lighting for all types of Iscor ceiling installations and can supply all necessary equipment.

FROM THE SALE of the constructional plant used in building the recently-completed Wemmershoek Dam in South Africa, it was expected that £200,000 would be realized, but the total actually reached was £260,000. The plant was sold on commission by George Cohen Sons & Company (South Africa) (Pty), Limited.

The BRITISH OXYGEN COMPANY, LIMITED, have completed arrangements to lease a large modern office building for their head office near Hammersmith. Construction will start almost immediately and it is expected that the move from the present premises in St. James's will take place in two or three years' time.

ALBION MOTORS, LIMITED, Glasgow, announced at the close of the Scottish Motor Show on Saturday, November 21, that during the run of the exhibition they had received orders worth £375,000. Of this total about 55 per cent. related to Reiver goods-vehicles, including an order from a West Lothian contractor for 22 chassis, worth £54,000.

MANUFACTURERS with strong Commonwealth trading links are being invited to take part in an exhibition at the Birmingham Engineering Centre during the Birmingham Commonwealth Weeks from February 4 to 20, 1960. The aim of the exhibition is to show how industry strengthens the Commonwealth ties by the exchange of manufactures and components.

THE DISTILLERS COMPANY, LIMITED, chemical division, announces reductions in prices of their acetate ester solvents (ethyl acetate, isopropyl acetate and butyl acetate), with effect from November 23. Also announced are reductions in price of the following plasticizers, to take effect from November 30: dibutyl phthalate; bisoflex 81; bisoflex 81 adipate, and bisoflex 100.

IN ORDER to provide improved and enlarged office accommodation from which to serve the Birmingham and the surrounding area, the Keith Blackman office in New Street, Birmingham, is moving on December 4 and will operate on Monday, December 7 from 1651, Pershore Road, Birmingham, 30. ('phone: Kings Norton 4151/2; the Telex number remains the same—33185.

RECENTLY, four Fairchild packet aircraft, C119, of the Italian Air Force arrived at Bovingdon Aerodrome, and were immediately loaded with the Italian Government's second Solartron radar simulation system, and the first one for the Air Force. The simulator will be used for tactical instruction and training in radar defence and attack and for operational and radar research purposes.

Mr. P. J. C. BOVILL, Master Cutler, and managing director of Newton Chambers and Company, Limited, presented awards at the firm's first-aid competition at Thorncliffe on November 13. A team from the services department won the Hoyland Shield, and the Bovill Challenge Bowl, for competitors under 25, was won by Michael Arrand, an 18-year-old apprentice. Winner of the individual test was F. Keetley.

SAMUEL FOX AND COMPANY, LIMITED, a subsidiary of the United Steel Companies, Limited, have developed a new stainless alloy specifically for the manufacture of watch and instrument springs. Known as Fortinox, the new alloy is already being used in the large-scale production of stainless unbreakable mainsprings for watches and precision instruments at the company's Stocksbridge works, near Sheffield.

FARMER BROTHERS (SHIFNAL), LIMITED, Shropshire, a company in the Metal Industries group, has secured a contract for the design, fabrication, erection and sheeting of new factory buildings for Jensen Motors, Limited, of West Bromwich. The main contractors are Neenan (Contractors), Limited, also of West Bromwich. The new buildings will provide Jensens with an additional 100,000 sq. ft. of floor space.

A DINNER for those connected with the H. L. Brown Ambulance Shield Competition, the premier and oldest ambulance competition in Sheffield, was given by Colonel D. B. Brown at the Royal Victoria Hotel, Sheffield, on November 12. This year's winners of the silver shield were General Refractories, Limited, Lowood Works, Deepcar, who hold the trophy for the first time. Steel, Peech and Tozer, Limited, were runners-up.

IN THE LAST SIX MONTHS, the Wednesbury steel foundry, F. H. Lloyd & Company, Limited, has booked substantially more orders than in the previous two years, including a five-year contract for Indian railways. Announcing this at a dinner for 500 employees on November 14, Mr. F. N. Lloyd, managing director, said that it had been decided to build an extension to the James Bridge works, doubling the present size of the machine-shop.

BRITISH BOILER ACCESSORIES, LIMITED, 62/63, Fenchurch Street, London, E.C.3, announce that they have recently entered into an arrangement with the Toronto Iron Works, Limited, of Toronto, Canada, for the sale of BBA steam accumulators and helical-coil heat-exchangers in Canada. The association between the two companies has started with a big contract for the supply of steam accumulators to the new Carling Breweries site in Toronto.

BAKER PERKINS, LIMITED, Bedewell Division, Hebburn-on-Tyne, have received a contract from the German firm E.G.O. Elektro-Gerate, Blanc u. Fischer, Oberderingen, for the supply of an automatic moulding line. The plant, which will work in conjunction with two 24 in. by 24 in. Taccone diaphragm moulding machines, will be capable of producing 150 moulds per hour and will include indexing mechanisms, roll-over and lowering devices, a closing device, automatic box-separation and powered conveyor lines.

Orders placed at the Scottish Motor Show in Glasgow, include those received by the Daimler company from Dundee and Aberdeen Corporation transport departments for double-deck bus chassis valued at £37,500. Eight chassis ordered by Aberdeen will have two-pedal transmissions of the semi-automatic type and air-operated brakes. The bodies will be built by Metropolitan-Cammell-Weymann. The Dundee order is for seven chassis, and the bodies for these will be built by W. Alexander & Sons, Limited, Falkirk.

Unemployment in the foundry industry is continuing to increase, particularly in the West of Scotland, says Mr. Robert Garland, national organizer of the Amalgamated Union of Foundry Workers, in a report to members. "It will be clear that Scotland is suffering a disproportionate share of adversity at the present time, that Government action is necessary to correct this trend, and that the need for such intervention is immediate," he adds. In separate reports, several Scottish officials of the union report increasing redundancies.

The Department of Scientific and Industrial Research has selected Boston Spa as the site for a new national lending library for science and technology to be established by the Department. The literature is already being collected and the library will be set up in Yorkshire early in 1961. Sir Lindor Brown, biological secretary of the Royal Society, is chairman of the consultative committee set up to advise on the library. The collection of scientific literature will become the largest of its kind in the country, and it will be made available through a loan and photocopying service.

Consolidated Pneumatic Tool Company, Limited, announce the opening of a new district office in Bristol to serve industry in the West of England. The new office, which opens on December 1 will be under the management of Mr. J. D. Glover and is located at 1, Bedminster Down Road, Bristol 3, 'phone: Bristol 63736. Its operations will cover Somerset, Devon, Cornwall and part of Gloucestershire. The company's branch office at Bridgend, Glamorganshire, which previously served this area, will continue to operate as the south western district for the South Wales counties, Hereford and part of Gloucestershire.

Speaking at the presidential dinner of the Birmingham branch of the Incorporated Sales Managers' Association, Mr. W. R. Bowden, national chairman-elect, referred to the statement that "we have never had it so good" and warned that complacency could be fatal. He said that an endeavour should be made to inculcate into the trade union movement a sense of sales. "If there were a marketing organization in the unions we should not have these wildcat strikes," he said. Other speakers at the dinner included Mr. J. J. Gracie, vice-president of the Birmingham Chamber of Commerce; the branch president, the Marquis of Hertford; the Lord Mayor of Birmingham, Alderman John Lewis; Mr. Guy M. Chantrey, Midland branch chairman of the Institute of Directors; Mr. Harry Cranswick, Birmingham branch chairman of the ISMA, and Mr. Kenneth B. Atkinson, the US Consul in Birmingham.

Personal

Mr. G. B. R. Feilden has been appointed to the board of Hawker Siddeley Industries, Limited.

Mr. H. P. Forder and Mr. A. R. Hay have been appointed directors of the United Steel Companies, Limited.

Mr. Alan Froggatt has been elected a director of John Hill and Sons (Ironfounders), Limited, a subsidiary of the Staveley Coal and Iron Company, Limited.

Mr. John Walker, a director of the Morgan Crucible Company, Limited, London, S.W.11, has been elected a director of Lodge Plugs, Limited, Rugby, Warwickshire.

Mr. Tibor Haas, A.M.I.MECH.E., A.F.R.AE.S., has been appointed head of the design section in the newly-formed members' service department of the British Welding Research Association, Abington, Cambs.

Mr. E. W. Hancock, a director of Humber, Limited, and director of special projects for the Rootes Group, has succeeded the late Sir Reginald Cash as chairman of Coventry and District Disablement Advisory Committee.

Mr. C. J. Beaver, formerly works engineer for the chemical division of the Distillers Company, Limited, at Port Talbot (Glam), has been appointed by Birlec-Efco (Melting) to take charge of all Birlefco smelting.

Mr. James Ryder, assistant works manager of Tweedales and Smalley, Limited, Castleton (Lancs), has been appointed works manager of the company, following the promotion of Mr. Oscar Howarth to the position of works director.

Mr. T. W. Stanier, general sales manager of Marshall Sons & Company, Limited, Gainsborough, has been appointed London manager from January 1, to succeed Mr. F. A. Beal, London sales director who retires at the end of the year on medical grounds.

Dr. M. E. Foss, head of the Department of Metallurgy, Chemistry and Textiles at the Lanchester College of Technology, Coventry, has been appointed vice-principal of the College as from April 1, 1960. The College is to open in September, 1960.

Mr. P. Beynon has been appointed works manager, operational research and work-study at Steel, Peech & Tozer, a branch of the United Steel Companies, Limited. Mr. Beynon, whose new appointment becomes effective on December 1, is at present work-study manager.

Mr. William C. M. Matterson, managing director of Matterson, Limited, crane manufacturers, and chairman of Ormerod (Engineers), Limited, both of Rochdale, Lancashire, is to receive the honorary degree of Master of Science from the University of Leeds.

Mr. Oswald F. B. Baker has been appointed purchasing agent of Davy & United Engineering Company, Limited, Sheffield, to succeed Mr. V. C. Sykes, who retires next year. He will be responsible for the management of the purchasing department and the sub-contracts department.

Mr. Arthur Marshall, managing director of Thomas Marshall & Company (Loxley), Limited, refractories, Sheffield, has become president of the Institute of Clay Technology. Mr. Frederick William Clark, who is in charge of the brickworks of Richard Thomas & Baldwins, Limited, Crowle, North Lincolnshire, has been appointed chairman of the Institute.

Mr. A. J. S. Brown has been appointed chairman of Carlyle Air-Conditioning and Refrigeration, Limited, the new company formed this year by the Carrier

Personal

Corporation of New York in association with Stone-Platt Industries, Limited. Managing director of the new company is Mr. RALPH S. REYNOLDS. Other directors are Mr. H. W. HARPER, Mr. O. W. BYNUM, and Mr. J. M. RACHAL. Mr. A. H. CHILTON and Mr. S. K. PRESTIGE have been appointed alternate directors.

Mr. PETER MCGURK, who has been foreman of the moulding shop at the Lanarkshire Steel Works of Colvilles, Limited, since 1948, received a radio set from the works' staff association when he retired recently. Mr. McGurk served his apprenticeship with Hurst Nelson & Company, Limited, Motherwell, and started work at the Lanarkshire Steel Works in 1915.

The alloys division of Union Carbide, Limited, announce the following appointments within their sales organization:—Mr. COLIN DUNGER, previously area sales manager, Sheffield, is now assistant sales manager; Mr. WILLIAM SMITH, who has been the company's technical sales representative in Scotland for some time, is appointed area sales manager for Scotland; and Mr. WILLIAM PATON has been transferred from the division's development department, and is now area sales manager, Birmingham.

At a meeting of the board of Northern Aluminium Company, Limited, held on November 18, the board accepted the resignation of Mr. C. P. PATON, who is taking up an important position with Aluminium, Limited of Canada, at Montreal. At the same meeting Mr. TAYLOR CORNELIUS, who has taken over from Mr. Paton as Northern's general works manager, was elected a director of the company. Mr. Cornelius was until recently a vice-president of Aluminum Company of Canada, Limited, and manager of that company's fabricating division.

The following appointments have been made in respect of wholly-owned subsidiary companies of English Steel Corporation, Limited: Mr. W. D. PUGH—to the office of chairman of English Steel Forge & Engineering Corporation, Limited, English Steel Rolling Mills Corporation, Limited, English Steel Castings Corporation, Limited, English Steel Spring Corporation, Limited, and Taylor Bros. & Company, Limited. Mr. W. E. A. REDFEARN—becomes managing director of English Steel Forge & Engineering Corporation, Limited. Mr. R. G. H. TAYLOR—chairman of English Steel Export Corporation, Limited, and Mr. G. CRAVEN, D.S.C.—managing director of English Steel Export Corporation.

Mr. G. HAROLD TOWERS, chairman and managing director of John Readhead & Sons, Limited, South Shields, was elected president of the Shipbuilding Employers' Federation at the annual general meeting in Edinburgh recently. He succeeds Mr. ROBERT W. JOHNSON, chairman and managing director of Cammell Laird & Company (Shipbuilders & Engineers), Limited, Birkenhead. Mr. JOHN RANNIE, shipyard director of John Brown & Company (Clydebank), Limited, becomes senior vice-president. Mr. R. CYRIL THOMPSON, chairman of Joseph L. Thompson & Sons, Limited, Sunderland, and Dr. DENIS REBBECK, deputy managing director of Harland & Wolff, Limited, Belfast, were also appointed vice-presidents. Mr. ALEC H. WEEKS, managing director of the Penarth Pontoon Slipway & Repairing Company, Limited, Cardiff, was elected chairman of the conference & works board, and Mr. GEORGE HILTON, managing director of Scotts Shipbuilding & Engineering Company, Limited, Greenock, was elected vice-chairman.

Obituary

The death occurred on November 15, at the age of 78, of Mr. JAMES RAISTRICK, founder and a director of James Raistrick and Sons, Limited, Antley Foundry, Accrington. Mr. Raistrick who was originally in business as a brassfounder in Church, acquired Antley Foundry in 1934 and founded the company with his sons, George and John Raistrick.

Mr. GEORGE HARGREAVES PARKINSON, sales director of Ley's Malleable Castings Company, Limited, Derby, and a director of its associated company the Ewart Chainbelt Company, Limited, of Derby, died on November 19, at the age of 65. He joined the Ewart Chainbelt Company as sales manager in 1929, transferring to Ley's Malleable Casting Company in 1945 to take up a similar position. In the same year he became a director of the Ewart Chainbelt Company, and in 1947 became a director of Ley's. Mr. Parkinson was a Whitworth scholar and an associate member of the Institute of Civil Engineers.

The death occurred on November 14, at the age of 87, of Sir FREDERICK WEST, of West's Gas Improvement Company, Limited, Manchester, the company founded by his father, and of which he was managing director. One of the best-known industrialists in the North-West, he was also chairman of the Manchester Ship Canal Company from 1933 until he retired last year. He was president of the Institute of Gas Engineers in 1941-42 and of the Society of British Gas Industries from 1947-49. He was also a past-president of Manchester Chamber of Commerce, and of the Manchester Engineers' Employers' Association. He was Lord Mayor of Manchester in 1924-25, and was knighted in 1936 for public service to the city.

The JOURNAL staff regret to announce the death of their esteemed colleague, Mr. D. J. O. (Oscar) Brandt, metallurgical editor since 1957, of the *Iron & Coal Trades Review*. He was well known in metallurgical circles as a lecturer, author and broadcaster on the metallurgy and production of iron and steel, his book "Manufacture of Iron and Steel" being widely acclaimed as a standard work. Brandt was born on Christmas Day, 1919, and was educated at Clifton College and the Royal School of Mines, where he was awarded both the Associateship and a B.Sc. degree. After a period with Murex, Limited, he joined, in 1942, the Department of Tank Design at the Ministry of Supply. When the war ended, he became a member of the staff of John Miles & Partners (London), Limited. In 1948, he was employed by the British Iron and Steel Research Association as a senior scientific officer in the steelmaking division. He left BISRA in 1955 and before joining *Iron & Coal*, established a consulting practice, mainly concerned with the use of oxygen in steelmaking.

Trade Marks and Registered Designs

The Board of Trade have laid before Parliament Rules providing for admittance of the public to the hearing of certain trade marks and design matters by the Registrar. The new amendments require the Registrar to hear in public any dispute between two or more parties in connection with a trade mark or an application to register a trade mark, or any dispute relating to a registered design, unless, after consultation with the parties represented at the hearing, he otherwise directs. Hitherto the public have had no right of admission to such hearings. In order to give the parties notice of the change in practice, the new rules will not come into operation until February 22, 1960.

Company News

Guest Keen & Nettlefolds, Limited—Interim dividend on the £39,490,000 ordinary on account of the year ending January 2, 1960, is being raised to 5 (4) per cent. The total for the previous 53 weeks was 13 per cent.

Wilmot-Breeden (Holdings), Limited, manufacturers of automobile and domestic-appliance accessories, etc., of Birmingham—The 1959 interim payment is increased to 6 (5) per cent. The 1958 total payment was 13 per cent.

J. Brockhouse & Company, Limited, iron and steel founders, dropforgers, etc., of West Bromwich (Staffs)—The company is offering to acquire the 523,062 ordinary shares of its South African subsidiary not already held at 5s. 6d. per share.

Wellman Smith Owen Engineering Corporation, Limited—To mark the satisfactory trading results for the financial year ended March 31, 1959, and progress made by the Corporation, the directors are to make a special bonus payment to employees out of trading profits, equivalent to three weeks' basic salary with proportional payment to monthly-paid staff.

South Durham Steel & Iron Company, Limited—A final dividend of 8 per cent. makes 12 per cent. for the year ended October 3, 1959. The dividend is as previously, but the final is on an ordinary capital increased from £8,000,000 to £10,000,000 following conversion of £2,000,000 of the Finance Corporation for Industry loan into ordinary shares at par. Trading profits rose from £7,092,696 to £7,847,094, increased with investment income to £7,862,556, compared with £7,106,417.

Herbert Morris, Limited, makers of lifting and transporting machinery, of Loughborough (Leics)—Revaluation of capital assets during the year ended July 31 revealed a surplus of over £1,850,000, £774,315 of which is being utilized for a one-for-one scrip issue. The total dividend is unchanged at 25 per cent., tax free, on capital increased by an acquisition issue and consideration is to be given to declaring future ordinary dividends before tax. Group net profit was £445,053 (£561,592).

British Insulated Callender's Cables, Limited—Group sales for the half year to June 30 reached £63,000,000, compared with £57,000,000 in the preceding half year and £53,000,000 in the corresponding six months of 1958. Group net profits, before exceptional items, totalled £1,791,000, compared with £1,862,000 and £1,208,000, respectively. The interim dividend is maintained at 4 per cent. on capital increased under the acquisition of the Telegraph Construction & Maintenance Company, Limited, and Scottish Cables, Limited. A final of 9½ per cent. was paid on the old capital for 1958.

Charles Winn & Company, Limited, manufacturers of valves, etc., of Birmingham—The directors state that the greater part of the year ended July 31, 1959, saw a further deterioration in the difficult trading conditions which were reported the previous year and profit margins were adversely affected. There was a definite improvement in trading conditions towards the end of the year and there are signs of a more marked increase in new projects by Government departments and public authorities which should increase demand for the company's products. Group trading and investment income fell to £28,698 (£41,904), and after tax of £400 (£22,837), there is a net loss of £17,413 (profit £17,988). Dividend is reduced to 5 (6) per cent.

Export Opportunities

The Export Services Branch of the Board of Trade, Lacon House, Theobalds Road, London, W.C.1, announce that the Mundo Corporation, World Trade Centre, San Francisco, have informed the British Consulate-General at San Francisco that they would like to receive quotations from United Kingdom manufacturers of cast-iron soil pipes. Mundo Corporation, who were established about ten years ago and chartered as a Californian Corporation in January, 1956, operate as importers and exporters, and one of the lines in which they specialize is plumbers' supplies. Manufacturers interested in this enquiry should write by air mail direct to the Mundo Corporation, addressing their correspondence for the attention of Mr. E. H. Appleby. It is important that quotations should show both f.o.b. and c.i.f. prices in US currency. It would be appreciated if responding firms would copy their initial correspondence to the British Consulate-General, 2516 Pacific Avenue, San Francisco 15, California, to enable the enquiry to be pursued. Please quote reference ESB/26757/59 in any correspondence with Lacon House about this circular.

The Board of Trade also announces that Vicinay S.A. Particular de Sagarduy, Bilbao, Spain, are interested in collaborating with United Kingdom firms for manufacturing locally under licence. The firm are contemplating extending their activities to making anchors, stainless-steel propellers, pipes and other cast-steel goods used in the shipbuilding industry. Mr. Vicinay would, in particular, like to get in touch with United Kingdom manufacturers of stainless-steel propellers, who are interested in extending their activities to Spain.

The company was established in 1929, and made into a limited liability company in 1952. They are ironfounders and manufacturers of chains, wire, nails, and mechanical-handling equipment. Manufacturers interested in this manufacture under licence enquiry should write direct to Vicinay S.A. It would be appreciated if, at the same time, they would notify the British Consulate, 30 Gran Via, Bilboa, Spain, that they have done so. The Board of Trade reference number is ESB/26585/59.

Increases in Capital

G. L. Willan (Castings), Limited (Sheffield), increased by £5,000, in £1 ordinary shares, beyond the registered capital of £35,000.

Hartley & Sugden, Limited, boilermakers, etc., of Halifax, increased by £102,000, in £1 ordinary shares, beyond the registered capital of £140,000.

British Machine Chain, Limited, New Malden (Surrey), increased by £35,000, in £1 unclassified shares, beyond the registered capital of £15,000.

H. E. Samson, Limited, sheet-metal workers, welders, etc., of London, W.1, increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

Metalife Liquid Metals, Limited (formerly Southern Metalife, Limited), London, W.1, increased by £98,000, in £1 ordinary shares, beyond the registered capital of £2,000.

D. F. Smith & Company, Limited, wire workers, etc., of Stourport-on-Severn (Worcs), increased by £20,000, in £1 ordinary shares, beyond the registered capital of £5,000.

Pelkman-Morton Manufacturing Company, Limited, maintenance engineers, etc., of West Molesey (Surrey), increased by £10,200, in £1 ordinary shares, beyond the registered capital of £4,800.

Halifax Tool Company, Limited, Halifax, increased by £100,000, in 48,000 7½ per cent. redeemable cumulative preference and 52,000 unclassified shares of £1 each, beyond the registered capital of £50,000.

M. Henderson Clark, Limited, iron, steel, and metal merchants, etc., of Thornaby-on-Tees, increased by £47,000, in 7,000 ordinary and 40,000 preference shares of £1 each, beyond the registered capital of £3,000.

Book Reviews

Soldering Manual. Prepared under the direction of the AWS technical activities committee and published by the American Welding Society, 33, West 39th Street, New York 18, USA.

Soldering on the face of it, is a very simple operation and well within the compass of any handyman, but, as this publication shows in most clear and concise terms, there is more to soldering than meets the eye. The book is lavishly illustrated and details in full over 30 chemical compositions of tin/lead solders alone, in addition there are other compositions of solders for a diverse range of commercial and precious metals. The comprehensive range of soldering applications, types of joints, influence of fluxes, methods of preparation and the extensive variation of heating methods is a revelation to all who are interested in the application of solders.

Modern production methods have stimulated the development of new and improved techniques; and these as well as the older and well-established soldering methods are dealt with clearly and effectively. The publication will undoubtedly be of inestimable value to everyone concerned with joining of metals in any shape or form.

E. CHRISTY.

A Glossary of French-English English-French Foundry and Metallurgical Terms. Published by The British Cast Iron Research Association, Alvechurch, Birmingham, 1959; price 7s 6d. or $1.10 in the dollar area.

This little glossary, based on the experience of the Association's information department for a number of years, aims to supply foundrymen and metallurgists with English equivalents of French terms commonly used in the literature of ironfounding and ferrous metallurgy. It is, in fact, a working vocabulary and the terms included have been carefully examined in relation to their original context.

Many of the words included are those which cause difficulty to lazy translators such as, for example, *évent*, "riser," and not "vent." The reviewer is not too keen on the translation of the phrase *sur album* as "tied foundry," preferring the expression "builders' castings." It is an excellent glossary and well worth the price at which it is sold.

V. C. FAULKNER.

Publications Received

Powder Cutting and Flame Processing by Börje Brandstedt. Published by Höganäs-Billesholms A.B., Höganäs, Sweden, and obtainable from Powder Metallurgy, Limited, Berk House, London, W.1.

In parallel columns, this 148-page well-illustrated book is carried out in English and German—a feature not without interest in these days of international dictionaries. The book shows how by the introduction of iron powder into the oxy-acetylene flame, the whole field of flame-cutting is widened. The cutting of stainless steel, cast iron, non-ferrous metals, becomes easier and quicker, whilst even refractory materials can be tackled. In Table I in the book, is listed a wide variety of materials and the difficulty of powder-cutting them is recorded in relation to 18:8 stainless steel, taken as 100. Thus cast iron is quoted as 70, manganese-steel 120, aluminium and nickel 50, whilst a silica brick up to 200. Considerable space is devoted to the apparatus available for working the process and a wealth of practical information is given. For instance, Table VII *details the case* of cast iron where the figures are related to section thickness and give the pressure of the cutting oxygen, the pre-heat oxygen pressure, the acetylene pressure, the powder flow and cutting speeds.

Powder washing, a process used for fettling iron, steel, and stainless-steel castings, is amongst the latest adjuncts to Cinderella's beauty parlour, as it is said that it can remove cracks, tears, scabs and all such blemishes as castings are heir to. Here again full and clear details are given as to how the process should best be carried out. This publication is probably the first to be devoted to powder cutting: it is so obviously authentic that it is likely that it will be the standard work of reference for many years to come.

Aluminium and Magnesium Powder Grinding and Blowing and the Explosion Risk, being *Technical Information Sheet*, No. 5003, issued by the Fire Offices' Committee of the Fire Protection Association, 31/45, Gresham Street, London, E.C.2.

This *Bulletin* is free to readers, and it is advisable that advantage be taken of the offer, for the explosion hazard is always present when metallic powders such as aluminium and magnesium are being processed, and the results can be a major disaster. Very sensible advice is given for minimizing the risks, and it comes from a body having much experience of the subject.

Designing for Die-casting with Fry's Diecastings, Limited. Published by this firm from Prince George's Road, London, S.W.19.

This well-written and splendidly illustrated booklet covers about two dozen cases of die-casting, where design modification not only simplifies manufacture, but usually reduces weight and invariably gives a better-looking job. It is reasonably certain, that once a designer has studied the diagrams in the booklet he will possess the basic knowledge so to modify poor designs, as to effect real worth-while improvements.

New Catalogues

Reduction-gear Units. In publication No. 758, Crofts (Engineers), Limited, Bradford, cover by illustrations, diagrams, description, and extensive tabular matter, a dozen types of combined spur and worm double-reduction gears made by the company. The range goes up to 60 h.p. at ratios of 300 to 30. The brochure runs to 24 pages and the two shades of salmon pink which have been used in its production give it an attractive appearance.

High-duty Iron Castings. In a series of leaflets numbered one to six, the Incandescent Heat Company, Limited, Cornwall Road, Smethwick, Birmingham, illustrate and describe a number of different types of castings made in the company's Icanite brand of high-duty iron. Each leaflet of the six shows the application of the material to a different industry. The method of presentation is very pleasing.

Multivane Fans. In publication No. 2504, the Sturtevant Engineering Company, Limited, Southern House, Cannon Street, London, E.C.4, describe and illustrate a wide range of fans entering into the company's MVAZ range. For this a plethora of technical data is set out in about 24 pages in the form of tables covering the two types—standard and heavy. Information is also given on motor and vee-rope-drive selection.

Mr. CHARLES T. TENISON, chairman and managing director of Wm. Cumming & Company, Limited, manufacturers of foundry blacking and foundry machinery, etc., of Glasgow, died on November 10.

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Raw Material Markets

Iron and Steel

Most of the engineering and speciality foundries continue to obtain a high level of production of high-duty castings. Apart from collieries and railways, there is a good demand overall. The machine-tool industry is now specifying more freely and the foundries supplying castings to this trade are obtaining improved outputs, with prospects much better than they have been for some time past. The foundries catering for the motor vehicle trade are very busy and working full time. Up to recently these foundries have been able to obtain the required supplies of pig-iron of their choice—mainly in the low-phosphorus grades—without difficulty.

The supply of some brands of low-phosphorus irons, however, is now restricted, as the expansion in demand has liquidated stocks at the furnaces and is in excess of current output. Fortunately, from the several brands of low-phosphorus irons now available, the foundries have a much wider source of supply. Hematite pig-iron is in fairly good supply, although demands are increasing. The engineering and speciality foundries utilize fairly substantial tonnages of hematite in their mixtures, but the price differential compared with the low-phosphorus iron is a limiting factor in its increased usage. Refined irons where required are available.

The light-casting trade is fairly well employed, but much below capacity levels. The foundries supplying to the domestic utensil trade maintain a steady rate of production, and those catering for the building trade have fair commitments. Many of the jobbing foundries continue to obtain reasonably good outputs, but the textile foundries are only moderately employed. Demands for high-phosphorus pig-iron have been maintained at the improved levels, but adequate tonnages are available to the foundries, as well as for the export market when orders can be obtained. Outputs of basic pig-iron for the steelworks are sufficient for use and stock requirements and the expanding demands for this grade are satisfied fully.

Business at the re-rollers continues brisk and orders on hand enable them to obtain good outputs from a full working week. Heavy demands are forthcoming for small bars and light sections, and the mills supplying reinforcing rods are heavily committed for their outputs. Orders on hand are sufficient to keep the re-rollers fully occupied for some weeks ahead.

Most of the home steelworks have sufficient orders on hand to cover their outputs of steel semis well into the first period of next year, and difficulty is being experienced by the re-rollers in obtaining deliveries to implement the work on hand, particularly that urgently required. The re-rollers are practically denuded of stocks.

Non-ferrous Metals

Copper is a shaky market on both sides of the Atlantic. In some ways this is understandable as the present state of negotiations between labour and management in the US copper industry is beyond all comprehension. Nevertheless, negotiations for a settlement of the strike are taking place, accompanied by the usual rumours, and it is this situation which has unhinged the markets in both centres. Nervousness as to the outcome of the present labour-management discussions has been heightened by the recent statistics released by the Copper Institute, which showed that the *US* stock position was a lot better than the market *had been led to* believe. Indeed, at the end of October refined copper stocks totalled 78.308 tons, which is a very small drop from the previous month, when the figure was 79.826 tons. Moreover, production outside the United States in October, despite the strike in Chile, amounted to 137.498 tons, against 142.646 tons in the preceding month.

However, facts are facts and the most outstanding fact is that the US copper industry is still 80 per cent. strike-bound. How the markets will be affected will depend on how the old mixture of truth and rumour are ladled out for market and public consumption. Anyway, custom smelters are still not quoting a price and the producers' have not changed theirs, which still stands at 33 cents a pound.

The London market has been under pressure and found wanting. Price declines have been almost continuous over the past fortnight and if this trend is to continue it will require definite news that an important part or the whole of the US copper industry has come to some amicable agreement. Otherwise, the market could reverse its present price trend and go up again if the strike position continues to be a stalemate between management and labour. Not much evidence either way was gained by the UK stock figures, which showed that at the end of last week refined copper in LME warehouses totalled 6.852 tons, a rise of 44 tons on the week.

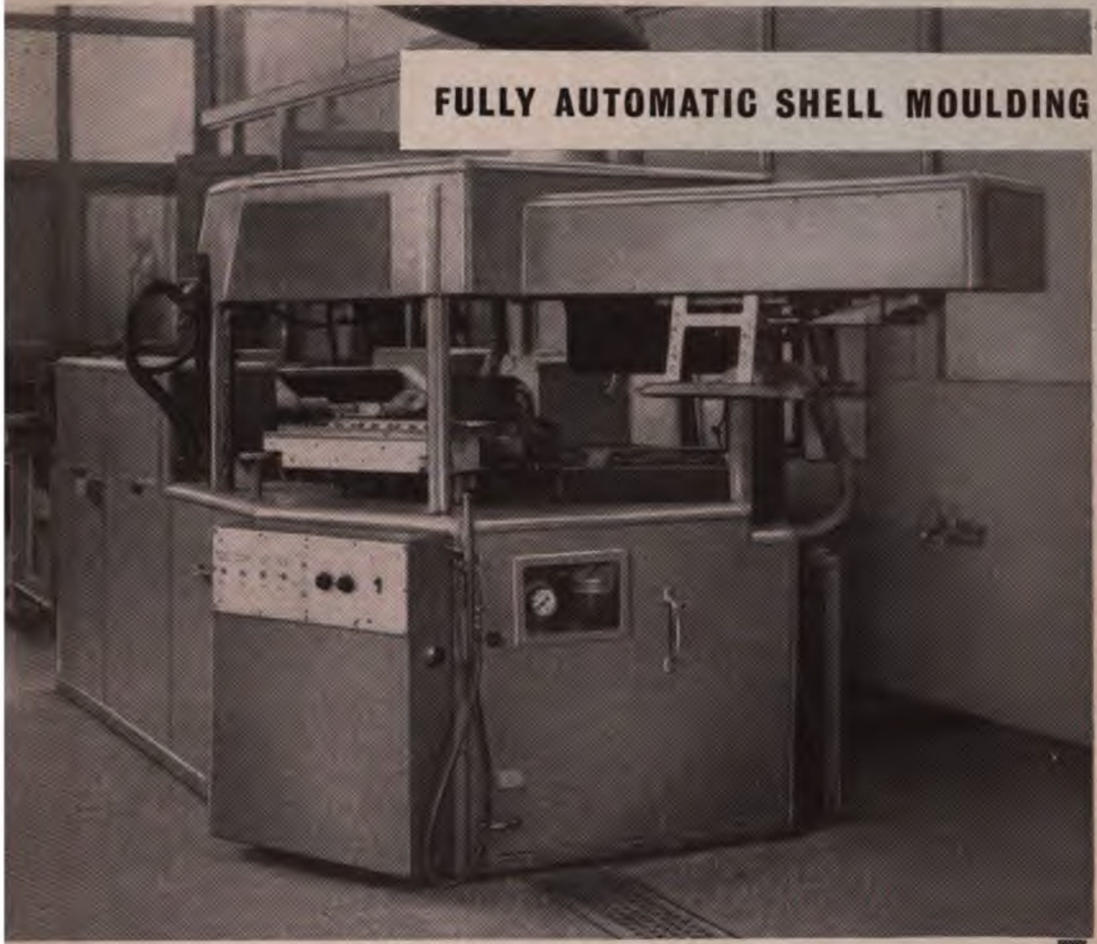
Tin, too, has come under pressure in London. The focal point of interest in this market is what will the International Tin Council decide to do about export quotas at its next meeting. There seems to be some evidence to support the view that the buffer stock manager raised its selling price by roughly £5 a ton a week or so ago from £794 a ton to just under £800 a ton. This move was interpreted by market observers as indicating that the buffer stock is now nearing exhaustion and that export restrictions would soon be removed. The behaviour of the cash price of tin does not bear out this interpretation in full, while any move to remove export restrictions on tin would release considerable tonnages of the metal built up as stocks in Nigeria, Malaya, and the Belgian Congo.

For these reasons the next meeting of the ITC is awaited with interest. It does appear a reasonable guess that whatever else the council decides, the quota restrictions will be raised at least 5.000 tons a quarter to 35,000 tons. This would be a fair amount of metal for the market to digest and would have to be considered together with the 2,500 tons which would be released from the Board of Trade to the buffer stock manager on December 28.

Demand from the East is not good, and at the beginning of this week the Singapore price fell to its lowest for nine months. Continental inquiry is quiet, but buying in London and in the US, if not heavy, has been steady. The US price is now less than $1.01 a pound. Stocks of tin in LME warehouses rose last week by 579 tons and now total 7,710 tons.

Lead is still a dull market and the price in London is not far above £70 a ton. The US market is quiet, with the price unchanged at 13 cents a pound. Zinc is firm and there has been no closing of the backwardation, indicating thereby that the metal is still scarce. However, the supply position has been made easier by the release of 3,000 tons for November delivery from the Board of Trade and the London price has eased slightly. The US price is unchanged at 12½ cents a pound for East St. Louis spot.

Of interest to both the lead and zinc markets is the news that Canada and Australia have warned the US that if she does not lift the restrictions on the import of these two metals they would consider adopting retaliatory measures.



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Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

November 25, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 2d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 2d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 11s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £240 10s. 0d. to £241 0s. 0d.; three months, £236 5s. 0d. to £236 10s. 0d.; settlement, £241 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 4½d. per lb.; rods, 257s. 6d. per cwt. basis; 20 s.w.g., 292s. 6d. per cwt.

Tin.—Cash, £792 10s. 0d. to £793 0s. 0d.; three months, £791 10s. 0d. to £792 0s. 0d.; settlement, £793 0s. 0d.

Lead (Refined Pig).—Second half November, £71 2s. 6d. to £71 5s. 0d.; second half February, £71 15s. 0d. to £71 17s. 6d.

Zinc.—Second half November, £94 0s. 0d. to £94 10s. 0d.; second half February, £90 5s. 0d. to £90 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £128 0s. 0d.; rolled zinc (boiler plates), all English destinations, £125 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £109 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 11½d. per lb.; sheets to 10 w.g., 210s. 3d. per cwt.; wire, 2s. 9½d.; rolled metal, 210s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £160; B6, £210.

Brass (High Tensile).—BS1400, HTB1, £193; HTB2, £209; HTB3, £222.

Gunmetal.—BS1400, LG2, £198; LG3, £208; G1, ½%, £265; G1, 1%, £255.

Phosphor Bronze.—BS1400, PB1 (AID released), £297; BS1400, 90/10/1, £285.

Leaded Phosphor Bronze.—BS1400, LPB1, £218.

Phosphor Bronze Strip, etc.—Strip, 297s. 3d. per cwt.; wire, 4s. 1¾d. per lb.; rods, 3s. 5d.; tubes, 3s. 5d.; chill cast bars; solids 3s. 4½d.; cored 3s. 5½d. (Charles Clifford, Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. to £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £244; AB2, £253.

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* Average 68–70 per cent.

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G. P. Elliott
(Northern Area)
'phone:
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T. H. Smith
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'phone:
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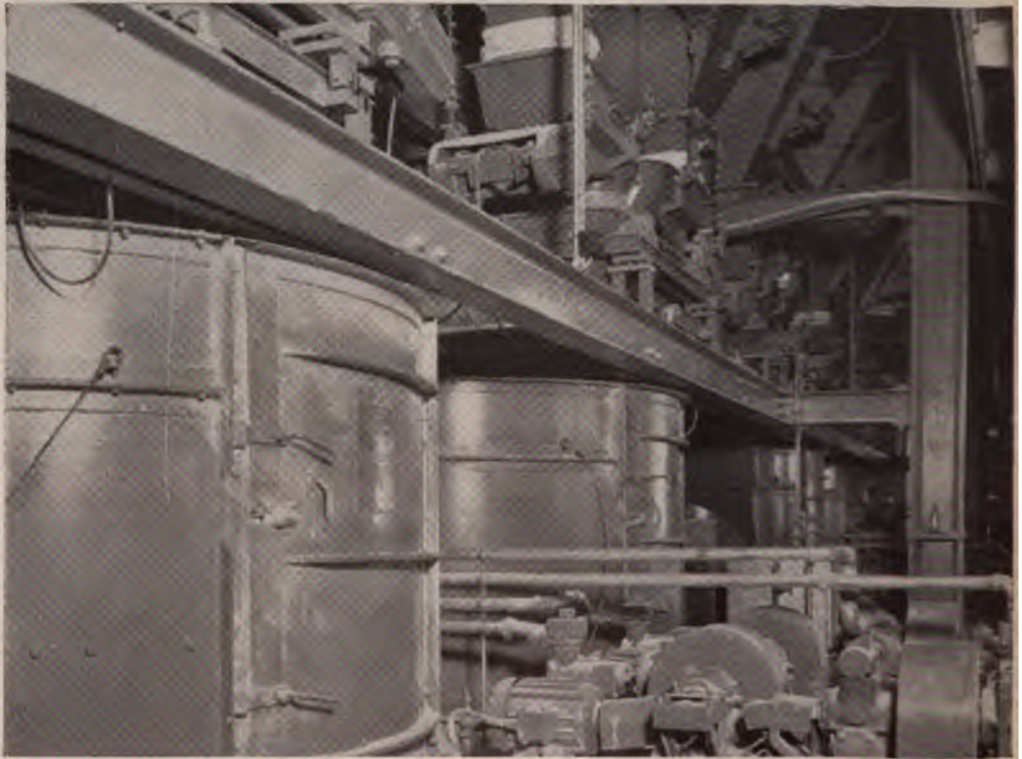
FOUNDRY....

AUGUST-SIMPSON *Mix-Mullers*

An impressive batch of four August-Simpson Mix-Mullers for Core Sand Mixing Plant—Large size 2F—each Mix-Muller having a batch capacity of 2,000 lbs. Each Mix-Muller is charged by means of an overhead batch hopper in conjunction with an automatic weighing plant. The charging operation and sequence for material and liquid additions, length of mixing cycle, and discharge mechanism are automatically controlled.



Photograph by courtesy of THE FORD MOTOR CO. LTD.

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer.

AUGUST'S LIMITED · HALIFAX · ENGLAND

Telephone: Halifax 61245/6/7/8 **Telegrams: August, Halifax**

FOUNDRY TRADE JOURNAL

Vol. 107 DECEMBER 3, 1959 No. 2243

Trade Conditions

In most areas of Great Britain, trade conditions are rapidly approaching a boom, and in this context it is germane to examine the cause of the change from the quite recent recession. According to Mr. Anthony Tuke, the chairman of Barclays Bank, improving trade conditions had their birth at the beginning of 1957 with a decrease in the price of raw materials in the year of about 15 per cent. This materially assisted our export potential, and though to-day the decrease is of the order of 10 per cent, it is still a favourable factor. As the ironfounding industry—by and large relying as it does on home-produced raw materials—enjoyed no such benefits, it never possessed any great margin of profits to pass on to the consumer. This reliance on home-produced raw materials may in some measure account for the existence of a level of profit lower than the general average of industry.

Government propaganda, in line with the Cohen Committee recommendations, is being directed towards the reduction of retail prices. This for the man in the street is sound sense, as there is no income tax to be paid on the money so saved, and moreover, the action is anti-inflationary. Acting in this direction also is a reduction in income tax, whilst conversely, increase in the general level of wages is inflationary. The foundry industry, however, does buy a large variety of goods and any help by way of reduced prices would be useful, not merely for the paying of higher dividends, but to swell the reserves, for most concerns are anxious to re-equip sections of their plant in order to manufacture more cheaply. Increased competition in many sections of the foundry industry can be anticipated in coming years, resulting from all the various proposals to reduce and finally eliminate tariffs.

The current position of industry needs much vigilance, for already we hear of impending shortages and, indeed, it is possible to visualize difficulties in the supply of castings for the machine-tool trade, as the order books are reported to be filling up extremely rapidly. A large number of ironfoundries have ceased to function, and as a result of the consequent reduction in capacity of the industry in certain directions, some producers are likely to be overtaxed in the near future, despite the inroads made by welded structures. The coming demands must be met intelligently and quickly otherwise more business will be permanently lost to the foundry industry.

Forthcoming Events

DECEMBER 7

Institute of British Foundrymen

Sheffield branch: "Measurement and Control of Dust in Foundries," by A. H. Sully, C. M. Stoch, and J. M. Slater, 7 p.m., at the College of Commerce and Technology, Pond Street.

Lancashire branch: "Patternmaking for Jobbing and Mechanized Foundries," by H. Blackburn, 7 p.m., at the Midland Hotel, Manchester.

DECEMBER 8

Institution of Production Engineers

Halifax and Huddersfield section: "Epoxy-resin Tooling," by E. M. White, 7.30 p.m., at the Percival Whitley College of Further Education, Francis Street, Halifax.

Institute of British Foundrymen

Coventry section: "Review of the First Five Years' use of the CO_2 Process in British Foundries," by A. Tipper, 7.30 p.m., at the Coventry Technical College, Room A5.

Institute of Fuel

"Waste Gas Corrosion," by Dr. G. Whittingham, 6.30 p.m., at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham 2. (Joint meeting with the North Staffs Fuel Society.)

Institution of Plant Engineers

Leicester branch: "Different Aspects of Lubrication," by P. Spray, 7.30 p.m., at the Grand Hotel. (Joint meeting with the Institution of Works Managers.)

Birmingham branch: "Safe Use of Electricity in Factories," by G. L. Leighton, 7.30 p.m., at the Hotel Leofric, Coventry.

DECEMBER 9

Institute of British Foundrymen

Birmingham branch: "Problems in the Calculation of Feeding-head Dimensions," by N. Snelson, 7.15 p.m., in the Lecture Hall, Byng Kenrick Suite, College of Technology, Gosta Green.

Combustion Engineering Association

Northern region: Discussion on the Clean Air Act, 2.30 p.m., at the Great Northern Hotel, Leeds.

Institute of Fuel

Yorkshire section: Discussion on the "Implementation of the Clean Air Act," 2.30 p.m., at the Metropole Hotel, Leeds.

North-western section: "Brains Trust" or "Any Questions," 6.30 p.m., at the Engineers' Club, Albert Square, Manchester. (Joint meeting with the National Society for Clean Air.)

Institution of Plant Engineers

Dundee branch: "Construction of Modern Factories with reference to Buildings at the Dundee Industrial Estate," by J. Watson Ritchie, 7.30 p.m., at the Taypark Hotel, West Ferry.

East Midlands branch: "Education and Technology in Russia," by I. G. Slater, 7 p.m., in the Sherwood Room, County Hotel, Theatre Square, Nottingham.

Western branch: "Hydraulics," by E. J. Pegler, 7.15 p.m., at the Grand Hotel, Broad Street, Bristol.

DECEMBER 10

Institution of Production Engineers

"Production Engineering Developments in Russia" (Sir Alfred Herbert Paper), by Dr. D. F. Galloway, 6.30 p.m., at the Royal Institution, Albemarle Street, London, W.1. (Admission by ticket only.)

Wolverhampton graduate section: Works visit to Quasi-Arc, Limited, Bilston, Staffs, commencing 2.30 p.m.

Institution of Plant Engineers

North-east branch: "Hydraulics," by F. H. Towler, 7 p.m., at Roadway House, Oxford Street, Newcastle-upon-Tyne.

Merseyside and North Wales branch: "Electrical Regulations," by D. A. Picken, 7.15 p.m., at "The Blossoms," Chester.

Institute of Metals

Birmingham local section: "Hot-dip Galvanizing," by M. L. Hughes, 6.30 p.m., at the College of Technology, Gosta Green.

East Midlands Metallurgical Society

"Vacuum Metallurgy," 7.30 p.m., at the School of Art, Green Lane, Derby.

Institute of British Foundrymen

Stoke-on-Trent section: "Some Practical Experiences in making Moulds in a Mechanized Foundry," by H. Pinchin, 7.30 p.m., in the Stipendiary Court Room, Hanley Town Hall.

Beds & Herts section: "CO_2 Process," by T. C. Wilson, 7.30 p.m., at K. & L. Steelfounders and Engineers, Limited, Letchworth. (Liaison meeting with London branch.)

Southampton Metallurgical Society

"Corrosion and Microstructure," by Dr. Edeleanu, 7.15 p.m., in the Engineering Block, Southampton University.

DECEMBER 11

Institute of British Foundrymen

Bristol and West of England branch: "Some Experiences in the Production of Copper-base Alloys," by G. W. Brown and C. B. Searles, 7.30 p.m., at the Royal Hotel, Bristol.

DECEMBER 12

Institute of British Foundrymen

Newcastle and district branch: Meeting at 6 p.m. in the Neville Hall, Westgate Road, Newcastle-upon-Tyne. (Details from the secretary.)

Scottish branch: "Mechanical Aids to Shell Moulding," by D. H. Scott, 3 p.m., at the Royal College of Science and Technology, George Street, Glasgow.

Institute of Metals

Council Elections

The Institute of Metals announces that the following members have been elected to fill vacancies on the Council with effect from the annual general meeting on March 29, 1960. *As president,* Sir Ronald Prain, O.B.E., HON.M.I.M.M., chairman and president, Rhodesian Selection Trust, Limited; as *vice-presidents,* Dr. H. M. Finniston, B.SC., A.R.T.C., F.I.M., research manager, C. A. Parsons & Sons, Limited, and Mr. H. W. Hignett, B.SC.(ENG.), F.R.I.C., F.I.M., assistant managing director, Henry Wiggin & Company, Limited, and as *ordinary members of Council,* Dr. R. W. K. Honeycombe, M.SC., Professor of Physical Metallurgy, University of Sheffield; Dr. Ivor Jenkins, F.I.M., chief metallurgist, research laboratories, General Electric Company, Limited; Mr. E. Robson, managing director, Manganese Bronze & Brass Company, Limited; Mr. J. Salter, B.SC.(TECH.), A.M.I.E.E., director, British Aluminium Company, Limited, and Mr. Christopher Smith, F.I.M., works director, James Booth & Company, Limited.

Forty Years Ago

In the December, 1919, issue of the JOURNAL, the Editor made a strong appeal for the creation of a research association, and noted with interest that founders in the Falkirk district were discussing the creation of a regional laboratory. In this issue the first mention was made of a sand-throwing moulding machine invented by Beardsley and Piper. A large number of new companies was listed and of these the following are amongst the survivors:—Dewhurst and Partner, Limited; Hilbrooks Foundry, Limited; Goodwin Barsby, Limited; Valbanca, Limited; Brassfounders (Sheffield), Limited; John Dewhurst, Limited; Lane and Girvan, Limited, and Atlas Diesel, Limited.

Mr. W. T. NEILL has been appointed managing director of Platt Brothers & Company, Limited, textile-machinery manufacturers, Oldham, Lancashire. Mr. Neill is an associate member of the Institution of Production Engineers and a fellow of the Royal Aeronautical Society. He was awarded the M.B.E. for services to the aircraft industry.

H. Lloyd's Radiography Unit

ld's Largest Gamma-ray Source for Castings Examination?

In order to meet increasing demand for radiographic inspect
is believed to be the largest gamma-ray unit ever installe
examination of steel castings has been set up at the Wednes
foundry of F. H. Lloyd & Company, Limited. A descripti
apparatus and its ancillary equipment is given in the followi

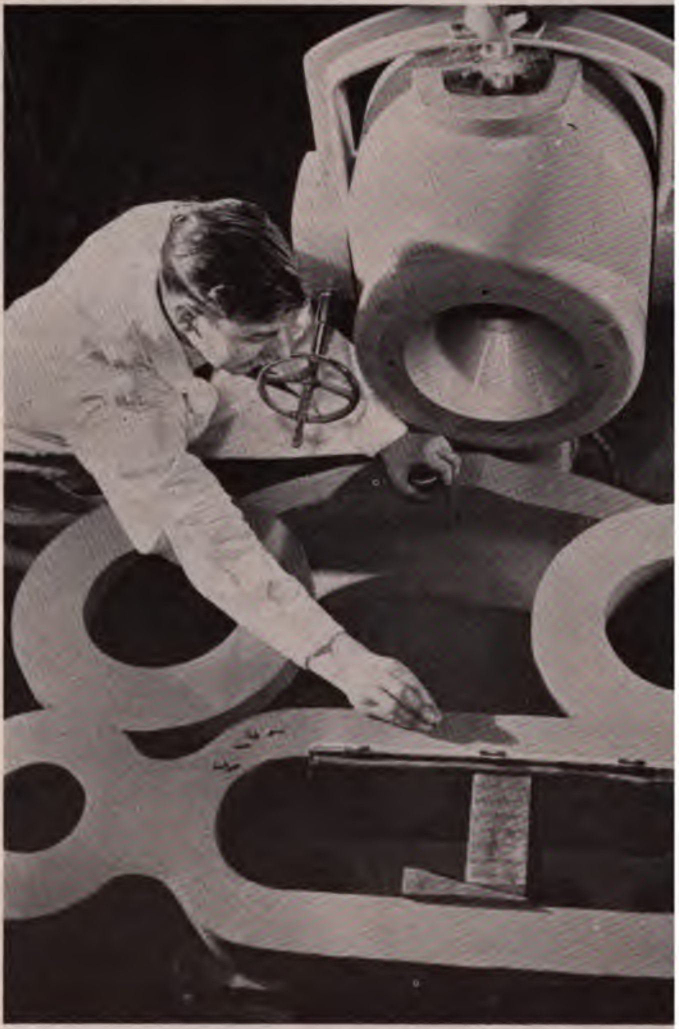
H. Lloyd & Company, Limited, of Wednes-
have recently installed a large gamma-ray
in their steelfoundry, for the examination of
gs. This remote-controlled unit (Fig. 1) con-
g 20 curies of cobalt 60, weighs 12 cwt. and
versally mounted to cover all angles of inspec-
The unit is basically comprised of two
s of lead—the storage sphere which houses
ource when not in use and the exposure
which incorporates a window in the form
0 deg. conical aperture.

wo 10-curie Sources

system, which was in-
in June 1958 and which
ow been well proved in
nt use, houses two 6 by
sources of 10 curies each.
are arranged one behind
ther, thus maintaining an
ve radiation area of 6 by
at the cost of only a
loss in speed, due to atten-
within the front source.
nit is suspended from a
ist (Fig. 3) giving a maxi-
height of 11 ft. over a
of 12 ft. The jib may be
through an angle of
eg. to cover a good area of
xposure room. Transfer
source from the closed
on to the exposed position
cted electrically from the
l panel illustrated in
Control of the source
effected from this panel,
is situated outside the ex-
area and exposure times
be pre-set up to a maxi-
of 24 hours by means of
process timers. The panel includes a lock
that the unit cannot be operated by an
ized person, and interlocks are provide
two points of access to the exposure roon

Exposure Room

Such a large source, even though it
tional in action, necessitates considerable
measures. The exposure room, situated i
somewhat remote from the foundry shops,



.—Setting up the 20-curie
raphic unit on a Lloyd's
casting. The film to be
d is located behind the
in the foreground; the
being a marine-turbine
(This casting is, in fact,
ain driving cylinder of a
turbine.)

internally 48 by 26 ft. and is constructed of brick wall 27-in. thick. The main door, which weighs 9 tons, is of concrete 15-in. thick and its movement is motorized. An outer wall around the building maintains the area in front of this door clear for a further 30 ft.

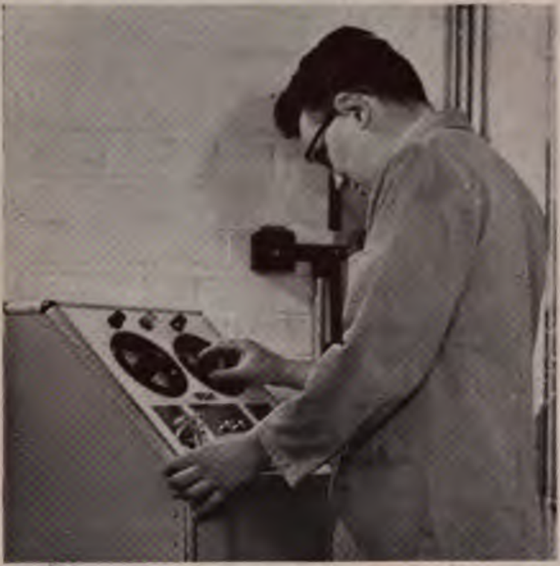


FIG. 2.—*Operating the remote-control panel for the radiographic unit. Exposures can be set for up to 24 hr. Audible and visible warnings are given at the end of each exposure.*

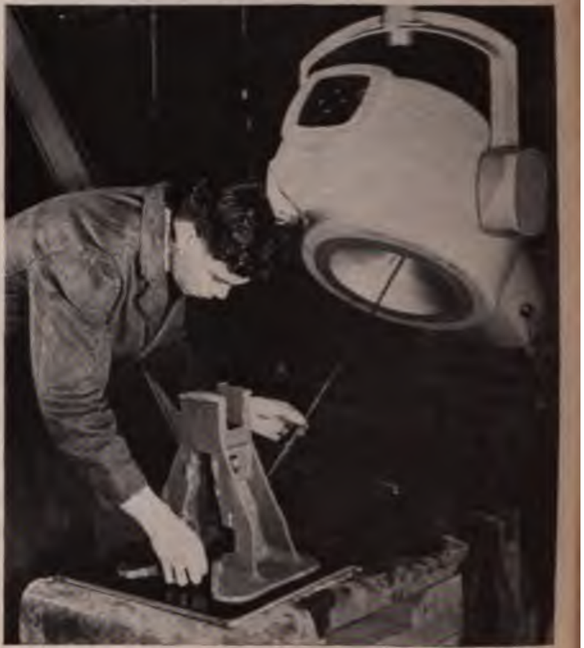


FIG. 4.—*(right) Setting the unit for examining an automatic-coupler casting. The sensitized film is placed under the base flange. Exposure is 10 min. at 36 in. using Ilford CX fine-grain film.*

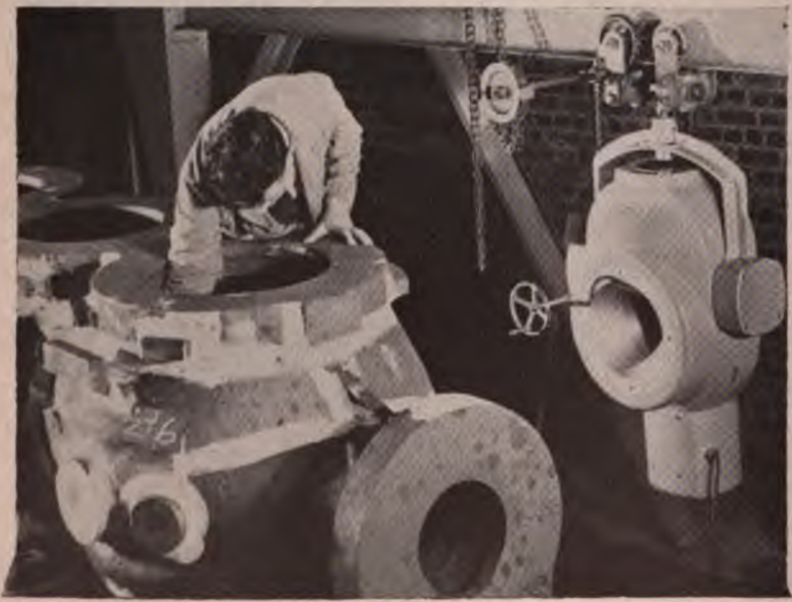


FIG. 3.—*Radiography of large valve castings; note the traversing mechanism for the unit carried on the beam of a jib crane. The casting in this photograph is set up on a 15-ton trailer.*

Background

F. H. Lloyd & Company, Limited, first introduced radiographic inspection methods in 1946 with the objective of assisting in the production of better and cheaper steel castings. Many customers quickly realized that these facilities were available for proving the internal soundness of castings, and since that time there has been an increasing demand for radiographically-inspected castings. To-day, in addition to an expanding domestic service, the radiographic requirements of customers and the major inspecting authorities are being met. Castings ranging in weight from a few pounds to 20 tons, and sectional thicknesses from half an inch to eight in. are regularly examined (see Fig. 4).

Other Sources

In addition to the cobalt source mentioned earlier, radiographic inspection is carried out with gamma-rays produced from other radioactive materials—iridium for sections up to ı. (the cobalt source for sections up to 8-in.), adio-active caesium is being introduced for the ness range of ¼ to 3 in. which is very fre- tly encountered. By using advanced tech- s, a two-per cent. penetrameter sensitivity over vhole section range has been achieved. The unit has substantially reduced exposure times he department is now in a position to examine ich larger tonnage of castings. (The following ypical exposure times with the 20-curie unit: steel section, 4 min.; 4-in. section, 20 min.; section, 2 hr., and 8-in. section 16 hr. exposure night)).

American Letter

Plastic Pattern Material*

tern cost influences casting cost considerably, so foundrymen like to have patterns that are low st and high in life expectancy. This is an account e author's efforts to find (*a*) a better method of ring patterns, and (*b*) a really long-lasting material.

ir

nventional repair materials, such as plastic wood poxy putties, and repair by brazing, welding and ring, were found to leave much to be desired. ually, a new rubber-like plastic material was tried, great success. Using this, a hardener powder is with a quick-curing plastic compound and d on the repair area. Depending on the amount rdener powder used, the material sets in 5 to in., and does a hard, dense repair job. After ning, the material may be sanded, milled, drilled, d, filled or chiselled without injury to, or dulling e tools employed. The finish obtained will take ntional pattern coatings such as shellac or lacquer, can also be used effectively without a coating. inexpensive, speedy to use, has good wearing cteristics and gives a substantial reduction in r time.

Life

review of conventional pattern materials which made indicated that some materials were more ion resistant than others, but all fell short of rements as regards really long life. Finally, how- the material mentioned above was selected as the best available. Its physical properties are in Table 1. The material's resistance to kerosene uel oils is excellent. Acids, alkalis, methylene chlor- benzine, carbon-tetrachloride, toluene and alcohol ither destroy the material or cause severe swelling. ough water absorption is almost negligible, there is a possibility of slight swelling in water or in humid atmospheres. Tests on this plastic rubber proved that it lasts longer than cast-iron or steel when exposed to abrasion, impact, etc.

LE 1.—*Physical and Chemical Properties of Solid Plastic-rubber Elastomers.*

on resistance	Exceptional
strength (tons per sq. in.)	1 8 to 2 9
tion (per cent.)	400 to 600
trength (tons per sq. in.)	0.13 to 0.33
ession modulus at 10 per cent. deflec- (tons per sq. in.)	0.04 to 0.44
ess, shore A	60 to 98
s of elasticity (tons per sq. in.) at 300 ent.	0.27 to 1.34
ession set resistance	Good to outstanding
esistance to 121 deg. C.	Continuous duty
to 177 deg. C.	Intermittent duty
c gravity	1.24

Disadvantages

One of the problems encountered was the adhesive binding of plastic rubber to metal. A suitable adhesive has now been developed which is economical and simple to use. The main disadvantage is that some of the materials used in producing the rubber are volatile, and can produce allergies or asthmatic conditions in persons working on its production who are sensitive to these materials. Some of the materials are also skin irritants, and upon the respiratory system and mucous membranes. Extreme care must be exercised in handling them at all times. However, this hazard can be reduced by adequate ventilation of work places. The production of this new material involves heat, vacuum, precise proportioning, close time-limits and extremely fast handling when the batch is ready. Wrong mould temperature, excessive amounts of release agent, and changes in relative humidity have a deleterious effect on the quality of the end product. While these problems may seem somewhat insurmountable at times, work now being done on simplification of the process holds great promise for the future. Tests have been sufficiently successful to indicate that plastic rubber has a definite future as a pattern material, and that reductions in repair and maintenance costs may be achieved by its use.

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pic discussed at the 1959 Congress of the American Foundry- Society; the Author, Mr. J. Edward Olson, is special applications er, Dike-O-Seal, Chicago.

Ohio Regional Foundry Conference

The Deshler-Hilton Hotel, Columbus, Ohio, was the scene this year of the Ohio Regional conference, on October 22 and 23. Included in the programme were the following papers: "CO_2 Process in the Foundry," panel discussion, chairman, E. H. King (Hill and Griffiths Company); "Electric Furnace Practice," by J. Hathaway (Massillon Steel Castings Company, Ohio): "Water-cooled Cupolas," by M. H. Horton (Deere & Company, Moline, Ill.); "Melting Brass by Induction, Indirect-arc and Crucible Methods," by A. W. Bardeen and W. J. Amsbary (Ohio Brass Company, Mansfield); "Hot-tears in Steel Castings," by J. A. Rassenfoss (American Steel Foundries, East Chicago, Ill.): "Inoculation—Control Tool for Acid and Basic Cupola Melting," by A. P. Alexander (International Harvester Company, Memphis, Tenn.); "Gating and Risering Copper-base Alloys," by W. Ball, senr. (R. Lavin & Sons, Chicago): "Metallurgy of Cast Steel," by C. K. Donoho (American Cast Iron Company, Birmingham, Alla.): "Manufacturing Procedure and Economics using Cold-set Oil Bond," by G. Johnstone, jnr. (Johnstone Foundries, Inc.); "Metallurgy of Aluminium and Magnesium," by E. E. Stonebrook, Aluminium Company of America, Cleveland); "Sand," by G. Vingus (Magnet Cove Barium Corporation): "Risering of Grey Iron and S.-g. Iron," by J. F. Wallace (Case Institute of Technology); "Solidification and Feeding of Malleable Iron," by B. C. Yearley (National Malleable and Steel Castings Company, Cleveland), and "Permanent-moulding Aluminium Alloys," by R. Petto, jnr., and R. Seher (Arrow Aluminium Castings Company, Cleveland).

A WORTH-WHILE REDUCTION in the price of their Chieftain truck chassis has been made by Albion Motors, Limited, Glasgow. The new Chieftain series II range of seven-ton truck chassis will now be marketed in Britain at some £50 below the price of previous models.

Equipment & Supplies

Vacuum Treatment of Molten Metals

Birlec-Efco (Melting), Limited, Tyburn Road, Birmingham, 24, are now marketing a de-gassing, and vacuum-refining unit (see Fig. 1) which, though claimed to be relatively inexpensive gives close control over temperature and pressure. Turbulence of the metal in the vacuum vessel is induced electromagnetically, and therefore cycle times are reasonably short, it is stated. A unit of this type has recently been installed at the Birmingham Works of Henry Wiggin & Company, Limited, for the vacuum refining of special alloys. Basically, it is a 15-cwt. mains-frequency induction-melting furnace housed in a tiltable vacuum-tank. A water-cooled copper induction-coil, which is supported by a magnetically-shielded steel framework, forms the furnace proper. It is claimed that careful design has ensured that no troubles will arise through electrical breakdowns within the furnace. Mains frequency was chosen not only because of the lower cost of the mains-frequency electrical gear when compared with high-frequency equipment, but also for the inherently greater degree of turbulence which a mains-frequency furnace imparts to molten metal. The present installation has a rating of 300 kw, and is arranged for connection to a low-tension three-phase supply. The vacuum tank, which houses the furnace, is mounted on trunnions and tilted by twin hydraulic cylinders. Hydraulic controls open and close the vacuum-tank lid and pneumatic clamps lock the lid on to the tank. The furnace mouth carries a refractory cover which reduces heat losses and cuts down the loss of metal by splashing. The vacuum-pumping lines are connected to the tank concentrically with the tilting trunnion, so that pumping connections are not demounted when the furnace tilts. The whole equipment has been designed for use by relatively unskilled personnel with a minimum of technical supervision.

Furnace Operation

A typical vacuum-refining cycle occupies about one hour, liquid metal being brought to the furnace by ladle. After charging and sealing, the chamber pressure is then reduced to about 200-300 microns in about 15 min. During refining sufficient power is applied to the furnace to ensure thorough stirring of the molten metal, and to maintain temperature at the desired value. After vacuum treatment, air is admitted back into the furnace, the hydraulic gear raises the lid and the retractable spout is placed in position. The temperature of the metal is adjusted and checked by dip thermocouple, after which the furnace tilts, pouring the vacuum-refined metal into a ladle for casting or teeming in the conventional way.

Results

High-temperature properties obtained so far on vacuum-refined metals have proved very satisfactory. A standard basic refractory lining is in use, rammed around a normal type of former. As the actual cost is said to be only a few pence per pound of metal treated, it is claimed that the mains-frequency de-gassing and vacuum-refining furnace can bring practically all the benefits of vacuum-melting into the foundry and melting shop at quite low capital and operating cost.

Furnaces for Enamel Fusing

The development of the Jetube radiant-heating element for use in vitreous-enamel fusing furnaces was referred to in a paper to the Scottish section of the Institute of Vitreous Enamellers in February, 1958. This aroused considerable interest, and since that time two prototype furnaces using specially designed Jetubes have been built and tested by the development division of Incandescent Heat Company, Limited (Cornwall Road, Smethwick, Birmingham). The first batch-type furnace using this system has now been built for an important vitreous-enamelling works, and will be in service shortly. A continuous split-crown type of furnace, also heated by Jetubes, has just been commissioned at the works of Smart & Brown, Limited, Spennymoor, Co. Durham. It is claimed that the Jetube radiant element (which may be gas- or oil-fired) gives an amazing flexibility of operation, and allows the use of a highly-insulated furnace structure with low thermal-storage; consequently fuel consumption is low, and output is increased. Jetubes have already been used in industry as heating elements in batch and continuous furnaces for carburizing, hardening, annealing and stress-relieving.

Dickow-Pumpen Centrifugal Pumps: Firth Cleveland Pumps, Limited, Stornoway House, Cleveland Row, London, S.W.1, are to manufacture under licence the range of self-priming multi-stage centrifugal pumps designed and developed by Dickow-Pumpen, of Wailkrayburg, near Munich, in Western Germany. The British company will be able to sell the pumps in all parts of the world, with the exception of the Common Market countries, Scandinavia and India.

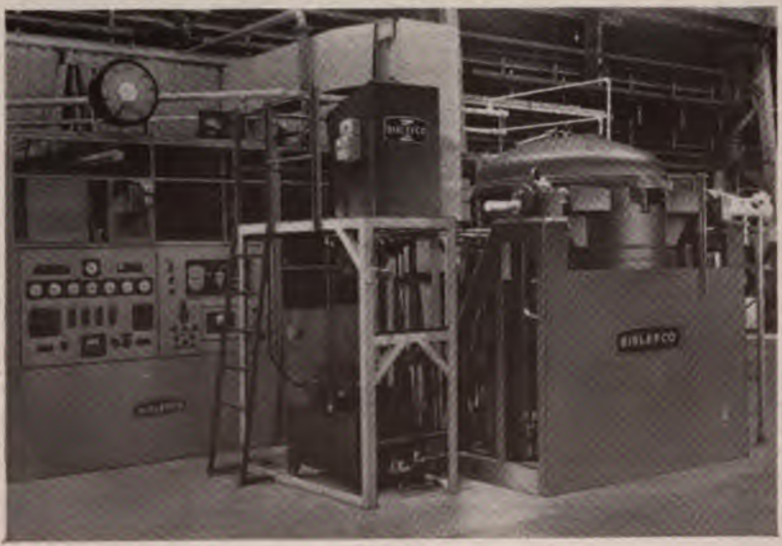

FIG. 1.—*De-gassing and vacuum-refining unit now being marketed by Birlec-Efco (Melting), Limited, of Birmingham. A water-cooled copper induction-coil, supported by a magnetically-shielded framework, forms the furnace proper.*

ish Cast Iron Research Association

on Activities during the Year ending June 30, 1959

This year's report of the British Cast Iron Research Association deals first with general subjects, such as elections to the Council and committees, finance, personalia and the "open days" at Alvechurch. The main part of the Report then describes *in extenso* the various research projects which are in hand, amongst which are investigations on the variation in degree of nucleation of grey iron, an extensive programme to obtain data on the maximum safe working temperature for cast-iron and other work.

nual general meeting of the British Cast
arch Association was held on November 3
nnaught Rooms, London, when the follow-
t covering the year's activities to June 30
ented:—

annual general meeting of the Association,
London on November 4, 1958, Mr. E.
C.B.E., was re-elected president of the
on for a further year, and the following
ted members of Council and vice-presi-
ir William Scott, O.B.E., J.P., M.I.MECH.E.,
Spurrier, M.I.M.E., and Mr. C. R. Wheeler,
r. A. E. Peace was re-elected a member of
and vice-president.

General

the year the Council held six meetings,
neetings were held by the advisory com-
Mr. H. J. V. Williams was re-elected chair-
Council for 1959 and Mr. M. M. Hallett,
M., was re-elected vice-chairman; Mr. S. H.
O.B.E., C.G.I.A., was re-elected honorary
The main committees of the Council
neetings. Mr. P. A. Russell, B.SC., F.I.M.,
Buckley, Mr. R. L. Handley, B.SC.(TECH.),
Mr. W. Brindley, and Mr. R. Taylor
l as chairmen of the research board,
ent committee, information committee,
atmospheres committee and Scottish com-
spectively. The operational research team
e was reconstituted as the foundry opera-
nmittee under the chairmanship of Mr.
arce.

n meetings were held by the sub-com-
nd panels of the main committees of Coun-
ng a total of 53 meetings during the year.
ociation is much indebted to its Council,
e and sub-committee members for their

the year the Council was strengthened
ection of Mr. W. Brindley in November,
l more recently by the appointment of Mr.
Redshaw in July, 1959. The Council
with regret the resignations of Mr. J. F.
nd Mr. A. Wynn. It was with great regret
Council in June, 1959, learned of the
Dr. J. E. Hurst, C.B.E., J.P., a member of
ince 1925, and president of the Association
0 to 1952, and also in the same month,
ath of the Right Hon. the Viscount Weir
ood, P.C., G.C.B., D.SC., LL.D., the first
of the Association from 1921 to 1924.

In June, 1959, the Council noted with pleasure the award of the O.B.E. in the Birthday Honours List to Mr. S. H. Russell, C.G.I.A., the honorary treasurer, and a past-president of the Association. In November, 1958, the Founders' Medal was awarded by the Worshipful Company of Founders to Dr. J. G. Pearce, C.B.E., for services to the art and mystery of founding, with special reference to the Fellowships of the Worshipful Company. In December, 1958, the Council welcomed the appointment of Mr. A. E. Pearce as a part-time member of the Iron and Steel Board. The Council is pleased to be able to report that although Sir Frederick Scopes, M.A., has relinquished his office of managing director of the Stanton Ironworks Company, Limited, he continues to serve on the Council and advisory committee.

The income and expenditure account for the year ended June 30, 1959, and the balance sheet as at June 30, 1959, accompanied the report. Income at £196,888 is £3,433 less than the preceding year, but the previous year received the credit of an exceptional item of £5,000 for Patent assignments. Grant-earning income again exceeded £120,000, enabling the Association to earn the maximum Government grant of £56,000. The Association is indebted to the Joint Iron Council for subscribing the major part of grant-earning income, £114,386.

Finance

Revenue expenditure has risen from the previous year's figure of £175,449 to £190,527. The increase reflects the additional facilities provided by the Association for member-firms, and increased depreciation charges resulting from the completion of the foundry-atmospheres block and cupola installation. The excess of income over expenditure for the year is £6,361, and of this amount £5,000 has been transferred to the buildings and equipment fund, the balance of £1,361 being added to the general fund. The balance sheet shows that the net value of fixed assets now stands at £222,911, and current assets at £132,346 show an excess over current liabilities of £124,754. The buildings and equipment fund now stands at £252,500, and the general fund at £12,228. Capital expenditure during the year amounted to £75,642. Commitments in respect of outstanding orders for capital items at June 30, 1959, had been reduced to £12,228.

During the year the main problem facing the Council and advisory committee has been that of

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finance. Reference was made in the last Report to the need for additional funds to enable activity to continue at the current level and to provide for the first stage of the new laboratory block. The year ended June 30, 1959, was the last in the current quinquennium for Government grant, and towards the end of 1958 and early in 1959 a comprehensive memorandum was prepared, setting out the Association's case for Government grant for the next five-year period commencing July 1, 1959. The Association is much indebted to the Joint Iron Council for the considerable assistance given in the preparation of this memorandum. The Association's representatives, led by Sir Frederick Scopes, met the Industrial Grants Committee on March 19, 1959, and the Association was subsequently informed of the new terms of grant. For an industrial income of £135,000, it was announced that the Government would make a block grant of £50,000. For every additional £ of industrial income above £135,000, the Government would make a supplementary grant of 15s., subject to a maximum supplementary grant of £24,000. The terms for the preceding five-year period were that for industrial income of £100,000, a block grant of £40,000 was paid, and for every additional £ of grant-earning income above £100,000, a supplementary grant of 16s. was paid, subject to a maximum supplementary grant of £16,000.

Although the terms of grant are now more severe, an encouraging feature is the opportunity of earning £18,000 more Government grant than was possible under the old terms. The Council decided that these terms should be accepted by the Association.

Need for Additional Industrial Income

The need to raise additional industrial income to earn the block Government grant emphasized to the Council the need for some scheme to increase industrial income as rapidly as possible. During the year careful consideration was given to various alternative schemes by the advisory committee, assisted by useful discussions with the Joint Iron Council. It was finally decided in agreement with the Joint Iron Council that the most appropriate scheme was that for an additional grade of membership; the appropriate resolution was approved and adopted at an extraordinary general meeting held June 18. At September 30, 1959, the subscription income from United Kingdom ordinary (B) members, numbering 250, amounted to £22,158 12s. 1d. The Council considers that the initial response is encouraging, and would emphasize that it is in the interests of every member-firm to transfer to the ordinary (B) grade of membership in order to take advantage of the full services provided by the Association. It is particularly important that industrial income should be increased as rapidly as possible as it is impossible to make a start on the new laboratory block until sufficient funds are available.

Personalia

On December 31, 1958, Dr. J. G. Pearce, C.B.E., director of the Association for more than 30 years, retired, and Mr. H. Morrogh was appointed director, with Dr. H. T. Angus as deputy director. On December 15, 1958, a dinner was held at the Connaught Rooms, London, attended by 174 people, to pay tribute to Dr. Pearce's services to the Association and the ironfounding industry over so many years. Mr. E. Player, C.B.E., president of the Association, took the chair, and Dr. Harold Hartley, C.B.E., proposed the toast of Dr. Pearce. Mr. Player, on behalf of the Council and members of the Association, presented Dr. Pearce with a cheque for £900, and a silver tea-service and salver. The Council has retained Dr. Pearce as a consultant for two years, commencing January 1, 1959, primarily with the object of assisting in the changeover to the new membership scheme.

The director, Mr. H. Morrogh, visited the USA in July, 1959, to contribute a paper on the formation of spheroidal graphite in nodular irons to a course on ductile iron at New York University. In the short time available the director also visited a number of American foundries and research organizations.

The Council has approved the appointment of Mr. I. C. H. Hughes, M.SC., A.I.M. (assistant research manager), as research manager as from July 1, 1959.

On May 28 and 29, 1959, "open days" were held at Alvechurch. On the first day the number of visitors from member-firms totalled 247. On the second day the number was 152, including representatives from other organizations. The occasion was memorable for the opening of the new foundry atmospheres laboratory by Dr. J. G. Pearce, C.B.E., and the inauguration of the new foundry cupola by the president, Mr. E. Player.

In September, 1958, Mr. A. E. Pearce and Dr. J. G. Pearce resigned as trustees on the Association's pension scheme, and the Council appointed Mr. M. M. Hallett and Mr. T. E. Whiteside to fill the vacancies. Mr. T. M. Herbert, M.A., continues as chairman of the trustees.

The "visitors" appointed by the Department of Scientific and Industrial Research, Mr. E. W. Colbeck, M.A., F.I.M., and Professor A. J. Murphy made visits to inspect the Association's work during the year. On June 16, 1959, the Association was honoured by a visit from Sir Cyril Musgrave, the chairman of the Iron and Steel Board, in company with Sir Lincoln Evans, C.B.E., the deputy chairman of the Board.

Research Department

The work of the research department has been continued under the supervision of the research board, and the research committee, supported by its sub-committees: engineering castings, malleable cast-iron, white and chilled iron, sand and refractories, methods of analysis, fuels and furnaces, and light castings.

Shrinkage and Porosity

The degree of nucleation of grey iron, measured by counting the eutectic cells, has been shown to influence shrinkage characteristics and chilling behaviour, particularly in thin-sectioned castings.

ations have been carried out in members' es to study variations in degree of nucleation ir relationship to the quality of castings pro- Various processes to decrease the degree of on and improve soundness have been in the laboratory. A series of castings with degrees of nucleation have been water- ed at different stages of solidification and en examined microscopically to determine gress of eutectic solidification. . Similar are in progress on the influence of pouring ture.

gramme of work on the soundness of ingot in conjunction with the foundry techniques of the ingot moulds sub-committee of the Iron and Steel Research Association has now mpleted. The effect of casting expansion solidification on shrinkage formation in -graphite irons and the significance of hardness in producing sound nodular-iron ings, have been examined.

Cast Iron

tigations have shown that pinholing defects iron are caused by hydrogen pick-up from d mould, promoted by traces of aluminium ron, and recent work shows that a similar ism is responsible for pinhole porosity in rons used in malleable-iron production, aluminium is a common graphitizing A similar effect in some pearlitic malle- ons is ascribed to increased manganese

established that the maximum inoculating f ferro-silicon in grey iron is only achieved e ferro-silicon contains sufficient aluminium. h has been made for alternative elements to um which will ensure efficient inoculation causing pinholing.

s Enamelling

wing the work on gas evolution from cast connection with the blistering of vitreous , a further programme has been approved tinuance of the work. Factors affecting the of the casting skin and its further treatment ealing and shot-blasting will be studied in to blistering of applied enamels.

ical Properties of Cast Iron

tensive programme is in progress to obtain the maximum safe working temperatures iron with the object of raising the limit at set upon its use in steam engineering ions. The first part of the investigation l a number of growth tests and was men- in the last annual report. A number of ientary tests on growth have been carried e, both in air and steam. The second part investigation has now been undertaken to e creep properties of one of the irons, using p to 5,000 hours and temperatures up to C. Stress/strain relationships have been for cast irons of differing structures and with ctile and brittle matrices.

initiated to study the effect of phosphorus cast iron up to 1.0 per cent. with a range of silicon contents in inoculated and uninoculated irons has been completed. Phosphorus was found to increase tensile strength up to about 0.8 per cent. regardless of whether the phosphorus was increased in the charges or as a late addition. This increase is associated with an increase in eutectic cell number with increasing phosphorus content. The general relationships between tensile strength, carbon equivalent and Brinell hardness which commonly apply to grey irons are not applicable to phosphoric irons unless correction factors are used, since increasing the carbon equivalent by increasing the phosphorus content, also involves an increase in hardness. An increase in phosphorus content was also examined in relation to modulus of elasticity for inoculated and uninoculated irons.

A comprehensive investigation has been made of the effect of variations in section size on the mechanical properties of grey cast iron, with special reference to eutectic cell number, form and quantity of graphite, form of pearlite and quantity of ferrite. These factors affect the tensile strength and the stress/strain curve, and the rate at which the modulus of elasticity varies with stress. It has been shown that Brinell hardness and modulus of elasticity are not related to eutectic cell size and are only slightly affected by graphite-flake size. The former property is influenced primarily by matrix structure and the latter by graphite quantity. The coefficients of section sensitivity for tensile strength and Brinell hardness were found to be higher in weak irons than in strong irons.

Malleable Cast Iron

A survey has been made of the properties at present obtained both in test-bars and commercial castings in pearlitic-malleable iron. Indications are that the properties obtainable in as-annealed high-manganese pearlitic-malleable are inferior to those obtainable in heat-treated good-quality blackheart-malleable iron. A programme has now been undertaken, however, to determine the properties which can be obtained by heat-treating normal and high-manganese blackheart irons, commercially produced. The results will be considered when framing a projected British standard for pearlitic-malleable iron. A preliminary survey has been made of the hardenability of commercial pearlitic-malleable irons.

A programme of work has been begun to determine means of obtaining optimum mechanical properties in a normal commercial blackheart-malleable iron. In particular, the use of increased phosphorus contents to raise the proof stress without causing serious embrittlement, has been studied.

The properties obtainable in blackheart irons for a wide range of carbon, silicon and phosphorus contents are being determined. Blackheart-malleable iron shows no true yield point, and 0.2 per cent. and 0.5 per cent. proof stress values have been used throughout; a strain recorder is being developed to determine these values on test-bars of various British and Continental sizes. The use of combined additions of bismuth and boron to give satisfactory annealability in such irons has been demonstrated. Means are being

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studied to avoid the formation of surface carbides in blackheart-malleable iron.

The investigation on inverse greyness is completed and it is established that this defect can generally be prevented by avoiding mottling tendency. Inverse greyness in whiteheart-malleable seems to occur under the same general conditions as for blackheart, though it is a much less common defect in whiteheart-malleable iron.

Graphite Formation

A study of the nature of eutectic cells shows that within a eutectic cell, the graphite flakes are inter-connected and constitute a zone of weakness. An improvement in strength is generally given by increasing the eutectic cell number. Phosphide eutectic is shown to exist as inter-connected filaments, even at around 0.4-per cent. phosphorus. This information has assisted the understanding of the influence of phosphorus upon the shrinkage behaviour of grey iron. New evidence has been obtained to show that under-cooled graphite originates by direct solidification and not *via* a first formed carbide. Investigation of the melting points of the grey and white irons' eutectics shows that at a suitable heat-treatment temperature, the white-iron eutectic may melt and re-solidify as a grey-iron eutectic. Only under these conditions can heat-treatment of white irons yield normal flake graphite.

Corrosion

An investigation of the corrosion of cast-iron in the engine waterways of road vehicles, due to anti-freeze solutions, has now been completed. A progressive decrease in the inhibitor content of the coolant and a simultaneous increase in acid content occurs with time. This acid is ascribed to the oxidation of the glycol.

Work on the cathodic protection of ships' propellers has been chiefly concerned with the degree of anode shrouding required and the shaft-to-hull potentials for various types of ship, and propeller design, with the object of defining recommendations for cathodic protection. Some work is in hand on the examination of various corrosion-inhibiting propeller coatings. This work is carried out with the co-operation of the British Shipbuilding Research Association

Sands Research

Construction of the power unit and heater for the new di-electric heating unit is almost complete. Preliminary tests indicate that a rate of heating of 1,000-deg. C. per min. will be obtained with standard test-pieces. The new equipment has been so designed that the atmosphere surrounding the test-piece can be controlled. Building of the testing equipment has begun.

The results of an investigation of the properties and testing of materials used in the CO_2 Process have been published and work has now begun on the causes and prevention of metal penetration into CO_2-Process moulds. The strength and deformation to rupture of a wide range of sands has been measured with slow rates of strain. The range for which this method is satisfactory includes most of the clay-bonded sands in use and a report has now been published.

An investigation of the effect of mould rigidity on casting soundness is continuing and has been extended to cover the use of very hard greensand moulds and moulds containing various additions. A study of the effect of peat upon the properties of moulding sand at room and high temperatures has shown that, under some easily defined conditions, peat has an advantage over other materials available.

White and Chilled Cast Irons

Work on hot tearing, using restrained bar test-castings, has continued, with special reference to composition and test-casting design. The solidification sequences of white irons with (*a*) a ledeburitic eutectic structure and (*b*) a plate-like eutectic structure, have been studied by means of cooling curves and the examination of quenched samples.

The study of the influence of the degree of nucleation on chill depth and mottle spread continues, with reference to superheating and furnace holding time, composition, and other factors influencing the number of eutectic cells. The composition and melting conditions required to produce chilled-roller castings commercially, to closely-specified chill, hardness and strength properties have been studied, and the results have been successfully applied commercially.

High-chromium Irons

The influence of melting and casting conditions and of titanium and nitrogen additions on the grain size of 30-per cent. chromium irons has been studied and the relative importance of the different factors shown. Work has begun to study the influence of various heating cycles on the structure and properties of 30-per cent. chromium irons of various ranges of composition.

Ingot Moulds

In co-operation with the British Iron and Steel Research Association the BCIRA continues to examine the structures and compositions of ingot moulds to determine factors influencing mould life. There is also co-operation with a group of member-firms for the same purpose. Much of this investigation involves the answering of members' specific problems, most of which are concerned with factors affecting ingot-mould and bottom-plate life.

Cupola Project

During the year, installation of the experimental cupola plant has been completed and running trials have commenced. The plant comprises a 30-in. internal-diameter cupola which can be operated with hot or cold blast, with or without water cooling and with acid, basic or neutral linings. The two-stage blast heater will enable blast temperatures up to 800 deg. C. to be investigated. The plant is extensively instrumented, the apparatus including air-weight controller, blast-temperature controller, blast-pressure recorder, metal-spout-temperature recorder, charge-level indicator, water-volume and temperature indicators, and automatic top-gas analyzer. Ancillary equipment includes a bucket charger, wet-spark arrester, and a pig-casting

hine to dispose of all the metal which is likely
e produced. Stockyard equipment includes a
n gantry crane and covered bunkers for holding
ge materials.

roving trials on the blast heater are not yet
pleted, but all the other equipment is function-
correctly and the initial programme covers the
ing of about 80 tons of accumulated scrap test-
ings to produce a uniform stock of pig-iron for
re use. Melting the scrap is providing an
ortunity for the staff to become familiar with
cupola operation and to make final adjustments
e plant. Full accounts of the installation have
published in the FOUNDRY TRADE JOURNAL
y 28, 1959), the BCIRA *Journal* (June, 1959)
elsewhere.

lytical Research

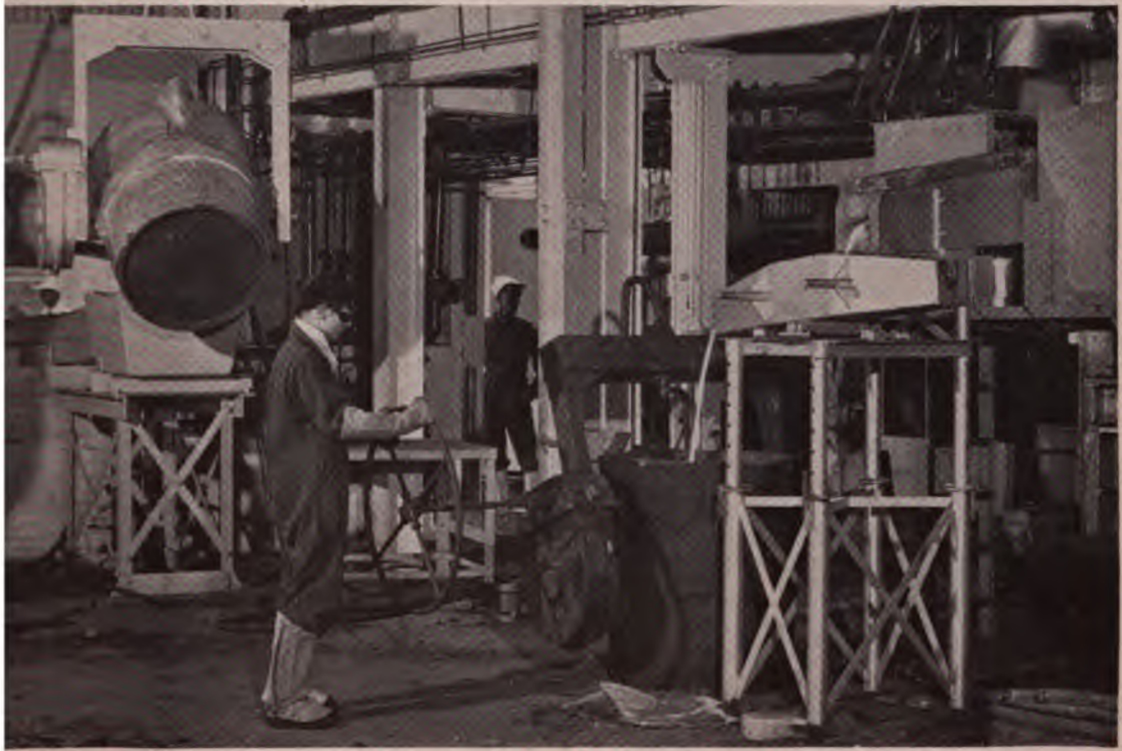
conference on the theme "Modern Methods
nalysis" was held in London in June, 1959,
the objective of bringing new analytical
ods to the notice of foundry chemists. The
part of the handbook *Selected Methods of*
lysis of Foundry Materials was published to
cide with this conference.

ork during the year has included the develop-
t of a rapid method for the determination of
nesium in nodular cast-iron, the examination
he combustion sulphur method using radiochemical techniques (in conjunction with Wolverhampton Technical College), and a method for the determination of very small amounts of cobalt.

A rapid method of sampling liquid cast-iron by using a rotary sampling machine has been examined and found to be very satisfactory. Much attention has been paid to instrumentation, improvements have been made to the cathode-ray polarograph and spectrophotometer, and a recording flame spectrophotometer has been constructed. Comparative tests of instruments for absorptiometric analysis have been made and the results have been published. In slag analysis work has continued on a volumetric method for silica and on a rapid gravimetric method. Analytical research has also been carried out in conjunction with the British Iron and Steel Research Association.

Work has been resumed on the spectrographic analysis of slags with the object of establishing a technique suitable for routine use. A series of synthetic slag samples has been made from pure oxides and used as calibration standards to test various techniques. Work has been undertaken to obtain standard compositions of nodular iron for spectrographic analysis. The spectrographic analysis of trace elements is undergoing re-examination, to enable the standardization of the various spectrographic methods to be brought up to date.

new BCIRA experimental cupola in operation, showing filling of a ladle from the tilting spout and another ladle in position over the pig-casting-machine launder (see also JOURNAL, *May* 28, 1959).



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Development Department

The development department has continued to maintain contact with member firms and users. Many enquiries which are received can be dealt with by work carried out in the routine laboratories; others, however, may involve special consideration and investigation, and it is this latter group which absorbs the greater part of the department's activities. These enquiries at Alvechurch reached a record level for the 12 months ending June, 1959, when a total number of 897 special enquiries was received, compared with a previous maximum figure of 873. The total number of individual visits paid by members of the Alvechurch staff rose from 366 in the year ending June 30, 1958, to 454 in year ending June 30, 1959. The total number of member-firms visited rose from 217 to 235.

The reduction in the demand for castings which was particularly apparent for this year over the whole of the country was therefore not reflected in the number of problems submitted to the Association, and enquiries appeared to increase as a direct result of the increased competition resulting from the limitation in demand. Problems relating to scrap castings appeared to predominate, but requests for assistance in cupola operation and advice on types of iron required for particular castings, or the design of castings for specific purposes, were also frequent.

Members of the department's staff have also been active on committees of enquiry dealing with cupola-coke quality and international standards, and investigations are still proceeding into the identification of dross and slag defects, cracking of diesel-engine components, materials for use in glass-bottle moulds, wear resistance, heat-treatment, and other projects. These investigations, which invariably commenced as a direct result of enquiries received, continue to occupy any time available to the staff that is not devoted to problems of immediate urgency, and the experienced gained is always immediately available and is constantly being reinforced by data gained from fresh enquiries. However, the need to deal promptly with urgent day-to-day enquiries inevitably reduces the rate at which these investigations can be completed.

Foundry Atmospheres Section

The foundry atmospheres section, under the direction of Mr. W. B. Parkes, occupied the new foundry atmospheres building early in 1959 and the building was formally opened by Dr. J. G. Pearce on the "open day" held on May 28, 1959. These new laboratories for the first time provide the staff of this section with full facilities, and include instrument rooms, a spacious laboratory for full scale ventilation and air movement tests and a basement in which heavy equipment can be housed, access to which is obtained through movable panels in the floor of the laboratory above, making possible the full scale reproduction of down-draught ventilation. The laboratories provide the most up-to-date equipment in the country for the study of dust formation and control, and air movement. An experimental programme, under Mr. R. I. Higgins, includes dust surveys in various foundries with suitable equipment, and the testing of full-size prototypes of dust-control systems for member-firms with special problems. The problem of ascertaining the free silica content of foundry dusts has been tackled by the purchase of an X-day diffraction apparatus, with which it is proposed to examine dusts obtained during the sampling surveys which are going on continually.

The advisory section, under Mr. W. H. White, deals with external enquiries, smoke and grit emission from furnaces and dust control in fettling shops, and has been very fully occupied as a result of the Clean Air Act. The Clean Air Act itself has raised very serious problems in connection with emissions from hot-blast cupolas, and in conjunction with the Council of Ironfoundry Associations a series of meetings with the Alkali Inspectorate has led to a tentative agreement between the industry and the Inspectorate upon the means to be employed for control of such emissions. These discussions have involved the department in considerable work, and surveys and investigations carried out by Mr. F. M. Shaw have provided much of the data upon which the final agreement was reached.

Scottish Laboratories

The Scottish Laboratories at Blantyre, under Mr. A. N. Sumner, carry out advisory work in the Scottish region and have shown a very marked increase in enquiries both from the foundries and from users of iron castings. Major problems have increased from 490 in the preceding year to 544 in the 12 months ending June, 1959, and an increase in routine examinations of approximately 25 per cent. has also taken place. These laboratories are now fully equipped to deal with almost any foundry or engineering problem, and the success of the policy of maintaining the standard of equipment and service has been justified by the increased volume of work which has resulted.

Foundry Operations Section

The staff of the foundry operations section have made some 46 visits to members' foundries to give advice on production methods and foundry layout. These visits, which have been made at the request of the foundry concerned, have dealt with a wide variety of aspects ranging from scrap analysis to cupola charging and foundry layout. Each visit has been supplemented by a report, and in many cases a diagrammatic sketch embodying any proposed revisions to layout has also been sent. Schemes for mechanized layouts have been developed, and in one case the section has co-operated extensively with a firm engaged in building a new foundry, and in the installation of a mechanized unit.

Although a large percentage of the work has tended to be of a technical character (*i.e.*, foundry practice, or mechanical handling), the application of work-study methods is being actively pursued.

*i n - measuring apparatus,
is capable of measuring
alternating at rates up to
ycles per second, used at
3CIRA for determining
s in all kinds of engineer-
mponents.*

" fact-finding " procedure
techniques are proving of
value, and in this respect
lerable interest is being
in memomotion.

ing the year a new ciné
a, and a special projector
frame-by-frame analysis
been acquired. The scope
plication of memomotion
que to the study of
ry processes is being ex-
d, and it has been used in two or three
ers' foundries with beneficial results. It is
ted that increasing use will be made of this
que in the coming year.

nomotion is also being used as a research
in particular, to make a special study of snap-
moulding methods, which are of wide interest
application in the ironfounding industry.
in this way, the technique will reveal the
is patterns of working adopted by different
tors, and will enable a quantitative compari-
o be made. Certain deliberate changes in
dure or equipment have also been made and
hoped to be able to evaluate these changes
itatively. This work has been initiated
g the past year and progress reports will be
red periodically.

ing the year, one member of the section
ed a short course on work simplification held
the auspices of the DSIR industrial opera-
unit, while another member participated in a
on the application of film analysis in work
at the University of Birmingham. Two
s have been prepared, the first a study of
r performance in cupola charging, and the
d on the consumption of raw materials in the
ry.

Information Department

Council has approved a change in the title
s department, previously known as the intelli-
department, to the information department.

al Work and Publications

earch reports published in the BCIRA *Journal
search and Development* totalled 26 and a
er of extended surveys of the literature on
is subjects were published in the BCIRA
in and Foundry Abstracts. A plan put
rd to consolidate these two publications from
ry, 1960, onwards under the title of BCIRA
al was approved by the information com-
and the Council. The new *Journal* will be
y increased in size, and there are changes in
ver, the paper and the typographical arrange-
ment. It will be published, as before,
months and will be sent free to memb
members it will still be available on
terms, which have been slightly increas
to cover the rise in printing charges du
10 years.

Eighteen external reports, consisting
given by members of the staff to outsi
contributed to technical journals, appe
the year and have been made available
Members of the staff contributed 13
other organizations and 22 lectures wer
as part of a post-graduate course at
University on foundry science and
October, 1958, to May, 1959. In addi
were contributed to the Internation
Congress at Liège in October, 1958, to
conference of the Institute of British
at Scarborough in June, 1959, and to
Colloquium at Aachen in March, 1959.
loquium was attended by Mr. G. R.
information department manager, and
Godding of the sand section. Mr. I. C.
research manager, was present in per
a lecture to the Convention of the
Foundrymen's Society at Chicago in

The Department gave some help in
with the 250th anniversary of the firs
use of coke in iron making at Co
organized by a National Committee
chairmanship of Sir Frederick Scopes.

Conferences

A meeting was arranged for members
on December, 16, 1958, to demonstrat
matic moulding and pouring plant
Fischer's, Schaffhausen. A film was
illustrate the plant, which was describe
Zehnder. A course on effective read
which there was a practical demonstra
Harvard University tests, was held
April 15 to 17, 1959.

Another meeting, held in London o
and 29, 1959, was attended by repres

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member-firms concerned with the production of white and chilled cast iron. The meeting was addressed by the director, Mr. H. Morrogh, who gave a series of papers on the solidification and chilling processes. On June 22 and 23, 1959, a conference on modern methods of analysis was organized in London, and was attended by more than 150 representatives of member-firms.

Exhibitions

The Association contributed exhibits to the Physical Society Exhibition in London, January 19-22, 1959, to the Factory Equipment Exhibition, London, April 7 to 17, 1959, and to the Safety and Factory Exhibition, Birmingham, June 19-26, 1959. In addition, an exhibition of equipment was organized with the co-operation of the Scientific Instrument Manufacturers' Association in conjunction with the methods of analysis conference mentioned earlier.

Foundry Education

Under the Association's training scheme three apprentices have recently completed their indentured apprenticeship and have now been appointed as assistants in the research department to continue their training. The Association has 13 apprentices who have yet to complete their indentures, undergoing training in the various routine laboratories. There are also a number of trainees who are not indentured who are appointed to given laboratories and who will eventually take up permanent appointments in those laboratories. Seven training courses on sand testing and control were held at Alvechurch with a total attendance of 64.

The Association continues to take an active interest in foundry education at all levels and a number of courses are in preparation at technical colleges. The director, Mr. H. Morrogh, has been appointed a member of the Council of Ironfoundry Association's recruitment, training and education committee.

Membership and Staff

The total membership of the Association in all categories stands at 1,281; the staff at present totals 141.

The Report is signed by Mr. E. Player, president; Mr. H. J. V. Williams, chairman of Council; and Mr. H. Morrogh, director.

John Williams' Acquisition

John Williams of Cardiff, Limited, have signed a contract for the purchase of the old Cardiff Foundry, Penarth Road, which was closed in June last. In future it will be known as the Taff River Foundry. Work has already commenced on the overhauling of machinery at the old foundry where castings in special alloys will be produced. A director of the company has stated that no appreciable increase in the labour force is envisaged in the immediate future, as personnel will be transferred from the firm's East Moors foundry.

B. O. MORRIS (HOLDINGS), LIMITED—Mr. Hermann *Kaufmann* has been appointed to the board.

New Catalogues

Automatic Couplers. The English Steel Castings Corporation, Limited, River Don Works, Sheffield, in publication No. A.C. 3/1, illustrate and describe the Willison type of automatic coupler for use in mining and other industries. Its major components are made from heat-treated manganese-steel. The brochure is pleasingly produced and includes a wealth of technical data.

Portable Electric Mould Dryers. In publication No. R31, the Electric Resistance Furnace Company, Limited, Netherby, Queens Road, Weybridge, Surrey, cover the main features of the Efco-Brown Boveri type of plant which the company is now manufacturing. The illustrations in the brochure show a few interesting applications, whilst the letterpress discloses the principles involved. Three sizes of mould dryers are detailed as to technical data, dimensions and weight.

Colloidal Dispersions. Graphite Products, Limited, Northfields, Wandsworth Park, London, S.W.18, in publication GP 53/59, deal with a phase of lubrication invariably complicated by the conditions of the applications. To quote from this four-page brochure:—"The choice of dispersion depends upon the application itself, and the function to be performed. Such factors as temperature, pressure, etc., may have to be considered. Thus it is a case of leave it to the experts, yet the case of coating dies seems simple enough."

House Organs

Nickel Bulletin—September/October 1959. Issued by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

This issue contains more than 100 abstracts of technical literature pertaining to nickel and nickel-containing materials. The abstracts include those from papers reporting investigation of the properties and fabrication of ultra-high-strength constructional steels. In the section on cast irons, an item refers to a comprehensive evaluation of the suitability of alloy irons for use in crushing and grinding plant. Nickel and its compounds are represented in references to papers on extraction, properties and analysis. Literature abstracted in the other sections of the issue ranges in subject matter from the properties of non-ferrous alloys and permanent-magnet materials to the operation of nickel-plating solutions and the influence of plating variables on the coatings obtained.

Foseco Foundry Practice, No. 137. Issued by Foundry Services, Limited, Long Acre, Nechells, Birmingham 7.

This issue carries articles based on the papers which won the joint second prize awarded in a recent competition organized by Foundry Services, Limited. The second article on the foundry of 1978—the subject of the competition—is reminiscent of Burmeister and Wain's Copenhagen foundry, which was installed several years before the 1939 war, and is still functioning. The articles in this magazine certainly have real interest for those creating new foundries or undertaking major alterations or extensions; they are not, however, meant to be followed in detail, as only lines of thought are indicated. Other articles cover a defect in a brass door-handle and the use of thermo-electric pyrometers.

Section devoted to the technology of producing
DIMENSIONALLY
ACCURATE
CASTINGS

Atmospheric Dust in Investment Foundries*

By C. M. Stoch, Dipl. Ing., F.I.M.

Atmospheric dust has long been recognized to be a health hazard in some industries, and also to have damaging effects on equipment, apart from contributing to unpleasant working conditions. However, because the investment-casting industry is comparatively new, little is known as yet about its particular dust problems. It is hoped that this paper, which is based largely on work carried out in the general field of industrial health by the British Steel Castings Research Association, will make all the general aspects more familiar to founders.

industrial country the contamination of the ere with dust and fumes concerns not only ngaged in various industries, but also the opulation. Air contaminants are always ce, and may be dangerous. This point can ated by recalling that, during the four-day fog in December, 1952, the concentrations e and sulphur dioxide rose to over four ir usual values, causing the deaths of 4,000

ry workers, in common with miners and in certain other occupations, are subjected nhalation of dusty atmosphere containing ous constituent. In the foundry, this con- s free silica, which originates from sand and ica-containing materials used there. The n of silica dust over a period of years may a proportion of workers developing silicosis, its later stages is progressive and disabling. ive research has been carried out, by many tions, into the various aspects of atmos- ist in industry. The British Steel Castings Association has pursued, over a period of ears, an active research programme in the l health field, and it is considered that many sults obtained and much of the experience ay be successfully applied to the investiga- o the dust problems associated with the on of investment castings. Because the nt-casting industry is comparatively new, nown as yet about its dust problems and the degree of their importance. There is evidence from the USA, however, that in some investment foundries a very high percentage (up to 63 per cent.) of respirable particles of free silica can be present in the foundry atmosphere[1].

Respirable Particles

Not all dust breathed reaches the terminal air spaces of the lungs, *i.e.* the alveoli. A large proportion of dust particles over about 10 microns† in size are likely to be caught in the nasal passages or at the back of the throat. Smaller particles which enter the bronchial tubes come into contact with the moist tube walls, due to frequent changes of direction, and some of them are deposited by impact. The smaller the dust particles the lower their momentum, and the greater their ability to move as an integral part of the transporting gas. The result is that only the smallest particles reach the alveoli.

Retention of Certain Sizes of Particle

The trachea and bronchioles are lined with hairs known as cilia, which cause a continuous upward movement of particles deposited in the mucous film, the dust being eventually either swallowed or sneezed or spat out. There is very little movement of air in the alveoli, as each alveolus is a dead end, so deposition of dust particles within the alveoli is by gravitational sedimentation. It is shown in Fig. 1 that the percentage of inhaled dust which is deposited here depends on the size of the dust particles. The maximum retention occurs at 1- to 2-microns diameter for particles of unit density and compact shape[2]. At about 0.3 microns retention is minimal, and the particles are mainly exhaled

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per, and the following one by Mr. J. Mitton, constitute alment of the series of papers presented at the first annual of the British Investment Casters' Conference (held at Rooms, London, on May 11 and 12). Mr. Stoch is head of igineering section of the British Steel Castings Research (See biographical notes on page 559.)

† 1 micron = 10^{-3}mm.

again. Above 5 microns few particles reach the alveoli since they are trapped higher up, and it is usual to refer to respirable dust as containing particles below 5 microns in size.

DUST MEASUREMENT AND SAMPLING

Dust can be measured by two main methods. First, while it is airborne, by measuring either its optical screening effect using a densitometer, or part of the scattered light using a Tyndallometer. The second method is to collect a deposit, which can be obtained by several means including filters, electrostatic precipitation, impingement, thermal precipitation and sedimentation under gravity. This deposit can then be assessed by weighing, optical measurement, physical, chemical or colorimetric estimation, or microscopic examination.

Atmospheric dust in foundries has been sampled by several investigators, who used either an Owens Jet counter, thermal precipitator or Hexhlet sampler.

Owens Jet Counter

The Owens Jet counter is made up of an entrance chamber lined with moist blotting paper to humidify the dusty air, a streamlined rectangular nozzle 0.1 by 1.0 cm. in size, and an impinging surface consisting of a rotatable microscope coverslip. Air is drawn rapidly through the nozzle by a hand pump of 50-ml. capacity, and the airborn dust is impinged on to the coverslip. The pressure drop, and consequent lowering of the temperature produced by the air passing through the nozzle, causes moisture to condense on the particles and eliminates the need for any adhesive on the coverslip. The advantages of the instrument are portability, lightness and ease of operation, but it has several important disadvantages :

(*a*) Assessment is by optical examination under a microscope, the number of particles in various size ranges being counted. This is both tedious and time-consuming.

(*b*) It is a "snap" sampling instrument and, although useful if the spatial or temporal variation of dust concentration is to be measured, a large number of observations must be taken and the results treated statistically if the average conditions of "dustiness" are to be assessed.

(*c*) Large particles and aggregates are probably shattered into smaller particles, thereby giving a high dust count in the small-size ranges.

(*d*) The sample collected is too small for an analysis to be performed by normal micro-chemical methods.

Thermal Precipitator

The principle employed in the Thermal Precipitator, for the collection of dust, depends upon the presence of a dust-free area around a hot wire. The dusty air is drawn by a water aspirator through a slot, across the centre of which is a filament heated to a temperature of approximately 100 deg. C. The *air passing* the filament precipitates its dust on to a microscope coverglass backed by a brass block mounted immediately behind the filament. The collection efficiency is 100 per cent. for sizes between 0.2 and 20μ, but the unit is subject to some of the disadvantages from which the Owens Jet suffers, *viz:* slow and tedious assessment, and a small sample which is difficult to analyze. Although not a snap sampling instrument, it is normally used for relatively short periods of time. Successful attempts have been made, notably by the Safety in Mines Research Establishment, to improve its robustness and still enable it to be used for longer term sampling. However, it is not, for the other reasons given above, an ideal instrument for use in foundries. Because of its excellent collection efficiency, however, it is often used as a standard instrument against which the performance of other dust samplers may be checked.

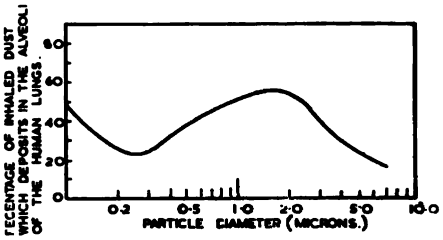


FIG. 1.—*Graph showing how the percentage of inhaled dust deposited in human alveoli depends on the size of the particles (Davies*[2]*).*

"Hexhlet" Sampler

To overcome the tedious nature of the counting process, instruments have been developed for counting automatically by using photocells and electronic recorders. The apparatus is, however, too costly for routine measurements in foundries. The British Steel Castings Research Association has therefore decided that the simplest and most effective instrument available for this purpose at the present time is the "Hexhlet" sampler, first described by Wright[3]. This instrument is size selective and collects only the dust which is less than 5μ in diameter. In this respect it copies the action of the human respiratory tract. Fig. 2 illustrates diagrammatically the functioning of the Hexhlet instrument.

Sequence of Operation

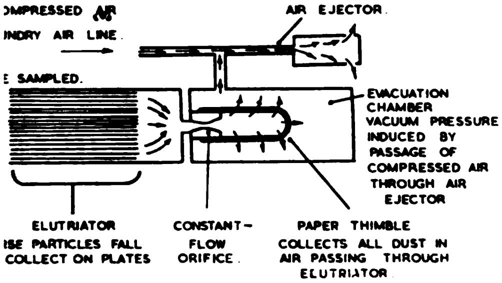
The air to be sampled is drawn through the instrument at a known and constant rate; coarse particles which would not reach the lung in normal respiration are collected in the first stage of the instrument, the elutriator, while the dangerous dust is collected in a paper thimble through which the air to be sampled is drawn. The air ejector is coupled to a compressed-air line, and induces a partial vacuum in the evacuation chamber which draws the contaminated air from the shop through the elutriator, the constant-flow orifice and collecting thimble. The air ejector incorporates a sound-damping chamber to minimize noise. The elutriator consists of two banks of 58 parallel aluminium the length and spacing of which are such) per cent. of the dust particles having a free speed equal to that of a 5μ sphere of unit ', and all the particles having the free falling of a 7.1μ sphere of unit density, deposit by .tional settlement on the plates and do not, ›re, pass into the collecting stage of the nent. The constant-flow orifice ensures that ses through the instrument at a constant flow [100±1 litres per min. The application to ejector of any compressed-air line supplying :h a pressure greater than 30 lb. per sq. in. .ck the dust-laden air through the constant-rifice at this rate. A pressure gauge is in-ated in the instrument to ensure that the um required air-pressure is applied to the . The Soxhlet paper thimble, which collects ist, is situated directly behind the constant rifice.

ation of Dust Concentration

r sampling for a chosen period of time the thimble is removed from the instrument, the ıt of dust collected being measured in one ways:

[he dust can be washed out of the thimble by e continuously recirculated over and through ıimble and subsequently centrifuged and :d.

More commonly, the thimble containing the ıample is incinerated at 700 deg. C., and :d, and the amount of dust (excluding any ıaceous matter) is derived by deducting the of the thimble ash.



›MPRESSED AIR
INDRY AIR LINE.
AIR EJECTOR.
: SAMPLED.
EVACUATION CHAMBER VACUUM PRESSURE INDUCED BY PASSAGE OF COMPRESSED AIR THROUGH AIR EJECTOR
ELUTRIATOR
ISE PARTICLES FALL COLLECT ON PLATES
CONSTANT-FLOW ORIFICE.
PAPER THIMBLE COLLECTS ALL DUST IN AIR PASSING THROUGH ELUTRIATOR

.—*Diagram showing how the Hexhlet dust-sampler works* (*Sully*, et al[4]).

e one then knows the weight of dust collected, ıe of sampling and the rate at which the air vn through the instrument, the respirable dust ıtration in the atmosphere is readily calcu- and is usually expressed as mg. per 100 t.

tages

rt from the fact that it is size selective, the ət sampling instrument has several other ıages when used for dust assessments in foun-

It is robust, and requires for its operation ı compressed-air supply, which is usually ; available in foundries.

(*b*) The sample is evaluated by weighing, and can be assessed by relatively unskilled personnel.

(*c*) Since it is a long-term sampler, average dust concentrations can be determined over long periods of time.

(*d*) The sample is sufficiently large for chemical or X-ray analysis.

DUST SURVEYS

Hexhlet sampling instruments have been used by BSCRA for measurements of the average dust concentration in the fettling shops of a large number of steel foundries. The results of an extensive preliminary investigation have shown that a sampling period of three consecutive days is adequate for measurements of average conditions of dust load.

Methods of Free-silica Determination

It is generally agreed that free silica is the major cause of silicosis, whereas the combined silica is relatively harmless. It is important, therefore, that the method used for determining the quartz content of airborne dust samples shall discriminate between free silica (quartz, cristobalite, tridimite) and combined silica (silicate, alumino-silicate, etc.). Experiments carried out by BSCRA, and by the refractories department of Sheffield University, have shown that the chemical method most commonly used, *viz.* that described by Trostel and Wynne[5], is not consistently reliable when used on airborne dust samples of fine particle size. On the other hand, the chemical method for the determination of free silica (utilizing phosphoric acid), described by Schmidt[6], has been found to be reasonably reliable and is used by BSCRA.

X-ray Diffraction

It has been established, however, that the most satisfactory method of determining free silica is the X-ray diffraction method. The accuracy of this method has been established by the examination of synthetic samples of the same particle size as the airborne dusts, and the results have been cross-checked with the Safety in Mines Research Establishment, who regularly use this method for the analysis of colliery dusts. The method has the additional advantage that it enables all crystalline constituents of the dust to be identified (provided that they are present in amounts of at least 1 to 2 per cent.), and also allows the various crystalline forms of silica to be separately estimated.

Results

The results of dust surveys carried out by BSCRA in 58 steel foundries are summarized in Table 1, which gives the maximum, minimum, and average values for total mineral-dust concentration,

TABLE 1.—*Results of Dust Surveys in the Fettling Shops of 58 Steel-foundries.*[4]

	Minimum.	Maximum.	Average.
Dust concentration, mg. per 100 cub. ft.	1.24	22.97	5.09
Quartz Content (per cent.) ..	1.00	37.00	6.90
Quartz concentration, mg. per 100 cub. ft.	0.04	8.40	0.39

the quartz content of the dust, and quartz concentration.

The complete chemical analysis of dust samples has shown that the main constituents of airborne dust in steelfoundries are iron oxides (Fe_2O_3 and Fe_3O_4) and silica. An analysis of all the survey results disclosed that the average quartz content is 7 per cent. Quartz contents of less than 1 per cent. have been measured in a few fettling shops which are large and well ventilated, or where the work-density level is very low. It has been observed that, in general, atmospheric pollution in industrial environments does not materially affect the observed dust concentrations. Furthermore, some of the dust measurements made in steelfoundry fettling-shops have given concentrations and quartz contents lower than the mineral content of the outside atmosphere, *e.g.*, in the steelworks area of Sheffield.

OBSERVATION OF DUST CLOUDS

During recent years the technique of photographing the movement of clouds of fine airborne dust has been developed, and used extensively in the design of exhaust systems. Its application to the dust problem in foundries was first described by W. B. Lawrie.[7] The method is based on a form of Tyndall beam illumination. In principle, it consists of the arrangement shown in Fig. 3: (*i*) a high intensity beam of light, (*ii*) a shield placed between the light source and the eyes of the observer, and (*iii*) a relatively dark background for the observer's eyes. Because a focused and narrow beam is employed, the illusion is created that all the dust is concentrated within the light beam, and the effect is very similar to that observed when sunlight enters a building through a roof ventilator, *i.e.*, all the dust seems to be moving upwards along the beam of sunlight. To observe the movement of dust clouds in the vicinity of a dust-producing operation, the light beam should be moved into various positions.

Smoke Generation

Another method, which is most useful in the study of ventilation air currents in local exhaust systems, is the generation of visible smoke. Cigarette smoke may serve in some circumstances, but specially-prepared smoke generators are more useful. Amongst the most commonly-used chemicals for this purpose are ammonium chloride and anhydrous titanium tetrachloride.

SUPPRESSION OF DUST

The Factories Act of 1937 requires that preventive measures of a practicable nature must be taken to prevent the inhalation not only of dust and fume likely to be injurious or offensive, but also any substantial quantity of dust of any kind. Complete prevention of the formation of dust is seldom possible, although this provides the best solution to the problem. Regulations have been introduced making illegal certain operations and processes known to produce dangerous silica dust, *viz*: the use of dry sandstone grinding-wheels, the use of dry sand in blast cleaning, and the use of silica flour as a parting powder. An example of the elimination of a dust-producing operation is the use of chemical processes in place of mechanical methods for cleaning castings. Dust-control methods can be put under three main headings: general ventilation, good housekeeping and local-exhaust systems. Respirators and masks are used where other methods of dust control are ineffective or impracticable, but personal protection should not be considered a final solution to dust problems.

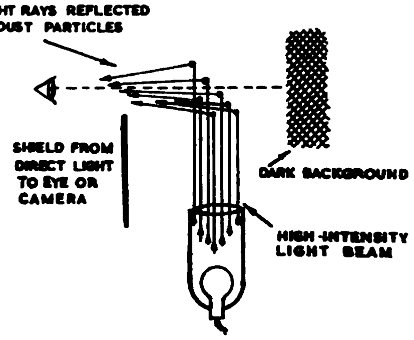

LIGHT RAYS REFLECTED BY DUST PARTICLES
SHIELD FROM DIRECT LIGHT TO EYE OR CAMERA
DARK BACKGROUND
HIGH-INTENSITY LIGHT BEAM

FIG. 3.—*Diagram of the Tyndall method of observing airborne dust.*

Ventilation Systems

General ventilation systems very often rely on roof ventilators, their effectiveness depending upon the direction of the wind and the temperature difference between the inside and outside atmosphere; this makes the ventilation unreliable and changeable In some foundries the ventilating air is introduced above the floor level and the contaminated air removed through hoods fitted at the points of dust generation, such as grinding machines, portable tools, fettling benches, knockout stations, etc. If applicable, this system of downward ventilation provides a more logical way of dust control than upward ventilation, in which all airborne dust has to pass the operator's breathing level on its way to the ventilator.

Local Exhaust

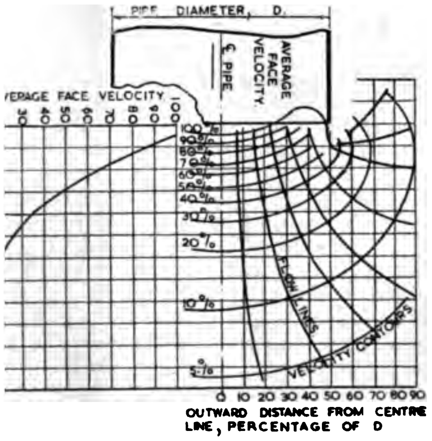
The function of local-exhaust ventilation is to capture the respirable dust close to the dust source before it disperses into the surrounding atmosphere. Fine dust is dispersed from the point of its generation by air currents which may be extraneous, or produced during the operation. The degree of dispersion of dust is a function of particle size. Large particles thrown from a grinding-wheel or cutter may be dispersed, due to their inertia, over a wide area, whilst small particles are dependent upon air currents for their dispersion. Because of their very small mass and kinetic energy, small particles are incapable of sustained flight, and cannot be projected far from the point of generation. A ıbrasive of 10-micron size thrown from 10,000 ft. per min., will fly to about air, but a $\frac{1}{16}$-in. particle projected with itial speed may be thrown 100 ft. Fine pension drift with the general air movemust be controlled, therefore, by con- flow of the entraining air. Table 2 ɛttling rate for silica particles of 10, 5 on. While particles of 10μ in size fall lly, particles of 1μ in size fall very under normal indoor conditions, where ent is never completely absent, they ıe indefinitely.

-*Free-falling velocity of Silica Particles in Still Air.*

size (μ).	Free-falling velocity (cm. per min.).
	189.6
	47.4
	1.8

of Hoods

ering exhaust hoods it is important to :hat all suction openings tend to draw from all directions, and that the velocity lly as the distance from the hood in- his is illustrated in Fig. 4, in which re expressed as percentages of hood-



raph of velocity contours and flow-lines in the radial plane of a circular e. The contours are expressed as a of the opening velocity.

ter, and velocities as percentages of ıverage velocity. Exhaust hoods must very close to the source of dust, and ıossible must enclose it. Dellavalle[8] hat the centre line velocities are affected ı the distance from the hood face, but ɛ hood-face area, and has given the ɛlationship:

$v/(100-y)=0.1\ a/x^2$, where

ocity in per cent. of face velocity.

od-face area

tance from hood face

This indicates that, for the same exhaust rate, large hoods are effective over greater distances than small hoods. Contours representing the same percentage of face velocity lie farther from the hood face. An improvement in the effectiveness of the hood can be obtained by providing a flange around the opening. In recent years extensive experimental work has been carried out on the development of local-exhaust systems. This has resulted in the provision of effective dust control on grinding machines and fettling benches. It is obvious, but not always remembered, that an exhaust hood alone will not control dust without an adequate volume of air to convey the dust into the exhaust hoods; regular maintenance of the ventilation equipment and check-up of the exhaust volume are essential to ensure an efficient control of dust.

CONCLUSION

A considerable amount of information on dust problems in general foundries is now available, and it is considered that this may be successfully used to improve conditions in investment foundries. To assess the health hazard it is essential to measure the concentration of atmospheric dust and to examine the samples; in particular, the amount of free silica, which is the most dangerous constituent, must be determined. Methods of doing this, and of observing and recording dust movements, are well established. It should therefore be possible to check the existing conditions and obtain information on how to improve on the present methods of dust suppression.

Acknowledgment

This paper is based largely on work carried out in the field of industrial health by the British Steel Castings Research Association, whose director and Council have agreed to its publication.

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DISCUSSION

After Mr. Stoch had shown the BSCRA film "Let's Clear the Air," the CHAIRMAN (Mr. N. Walker of Hadfields, Limited) asked Mr. Armitage to open the discussion.

Is all Dust Harmful?

MR. D. H. ARMITAGE (P.I. Castings (Altrincham), Limited), began by saying that, apart from the requirements laid down in the Factories Act, one owed a duty to one's employees, and that moreover

Atmospheric Dust in Investment Foundries

productivity would be increased by pleasant working conditions. However, there could be a danger in the tendency, prevalent in the investment-casting industry, to deny the existence of the dust problem because non-siliceous materials were in use. He then asked whether all dusts, whatever their composition, were not merely undesirable, but harmful to health, and secondly, what was the maximum allowable level of contamination. As the investment-casting industry was a new industry, he continued, there was an excellent opportunity to obtain fundamental information which could be of value to other industries. Moreover, it was possible to observe these conditions throughout the length of service of one man. One of the difficulties in steelfoundry work resulted from the fact that there was no opportunity to gather statistical information. When the speaker's firm had built a foundry three years previously, they had exhausted all potential dust-producing points. In addition, over the past three years, they had had a full-plate X-ray examination of all workers. The firm had been in existence for some seven years, and, on each X-ray examination, every plate had been clear. The missing information related to the level of dust concentrations under which they were now operating in the various shop sections. Mr. Armitage then asked if Mr. Stoch could tell him whether it would be a practical proposition to set up a dust-sampling and estimating department in his works, or could a dust-sampling service be obtained from commercial organizations, and said that one of the greatest difficulties in his firm was to persuade workers to use the protective equipment provided. They also provided vacuum-cleaners for the cleaning of clothes, but workers preferred to shake the dust off, so that it entered into the breathing zone.

All Dusts can cause Trouble

Mr. C. M. Stoch replied that there was no doubt that *any* dust was at least unpleasant; some were toxic, in particular silica and asbestos dusts, but, generally, any type of dust, even if it was not toxic, would eventually cause some lung trouble. It was now recognized that any dusty atmosphere would lower workers' resistance to lung trouble, including tuberculosis. There were no standards in the UK at the moment for maximum permissible dust-concentration in foundries. Some standards had been introduced, particularly in the coal-mining industry, and these included figures based on the dust-particles count, using thermal precipitators. Mr. Stoch continued that he believed that standards relating to dust in foundries had been introduced in some parts of the USA. He felt that, in the UK, the Inspectorate of Factories took the view that any dust was bad, and where a mixture of dusts occurred which contained even a small percentage of silica, it was not possible to exhaust the silica dust only, and leave the rest in *the air*—therefore it was necessary to exhaust all *the dust*. The X-ray examination of workers had been used in the steelfounding industry fc years, and had proved to be useful. How concluded, he would like to add a word c ing—it took many years for an operator in a dusty atmosphere to develop silicosis.

Mr. Armitage then said that his firm h doing X-rays for three years—the found been in operation for seven to eight years.

Mr. Stoch then emphasized that, eve seven years of operation without having ha of pneumoconiosis, it could not be ta granted that conditions were absolutely s some cases workers had developed silicos 15 or 20 years' work in a foundry.

Mr. Armitage agreed with Mr. Stoch, that surely the important point about X-ra nation was that it was possible to disc slightest sign of lung change and do s about it.

Dust-sampling Procedures

Mr. Stoch then said that, with regar setting up of dust-sampling procedures, tl the Hexhlet dust sampler, and the asses samples, was very simple and did not skilled operator. The sampler required c pressed air or an electrically-operated pu for the assessment of the samples, a l furnace was required in which they cinerated at 700 deg. C., and a balance, v usually available in any laboratory.

The assessment of free silica in sam more complicated and, at the BSCRA Station, the X-ray diffraction unit was samples were now assessed on a routi This was part of the Association's s Members. A number of steelfounders the Hexhlet dust sampler regularly—the ated the samples, and then sent it to BS the assessment of free silica. There was to stress the value of this procedure, but tl checking of dust concentration gave son tion as to whether conditions were imp whether they were getting worse. As were installing more and more equipme control of dust, the regular checking of centrations in the atmosphere provided r formation on whether this expenditure v favourable results.

Persuading Personnel to wear Respir

Very great difficulty still existed, he in persuading men to wear respirators Nearly all steelfounders now had a well respirator service, which encouraged because they saw that care was taken a spent to keep the respirators in good condition. On the other hand, wearing all day, especially on a hot summer day, trying. Moreover, the more efficient th tor was from the point of view of the re respirable dust, the more difficult it was through it. Two steelfoundries had intr air supply into the cavity of the norma respirator, in order to improve the cc wearing and breathing through it. This innovation had been particularly welcomed by those engaged in powder washing and powder burning, where, in addition to dust, discomfort resulted from heat. In one foundry which had introduced this development about three years ago, the workers were so impressed that they requested the management to introduce more respirators of this type—a very encouraging case, because normally the management had to urge the workers to wear respirators.

Mr. Armitage then asked whether Mr. Stoch considered that a survey, such as that suggested, would add to knowledge of dust problems at this stage.

Mr. Stoch said that it would, most definitely, especially as the only available data were contained in an American paper. In some foundries, where the air apeared to be clean, sampling had revealed quite a high concentration of atmospheric dust.

Counting Devices

Mr. H. Lister (Fairey Aviation Company, Limited) entered the discussion here by remarking that, using microscopic techniques, at a particle size of ½ to 2 microns, great difficulty arose in separating the particles, as they tended to agglomerate, possibly due to surface attraction.

Mr. Stoch replied that counting constituted a great difficulty in assessing the concentration by particle size using, for example, thermal precipitators, or an Owen's Jet. It was not only time-consuming and tiring, but required a skilled operator. Automatic counting-devices were now on the market which made it possible to count the particles in various size ranges accurately and efficiently, but they were expensive and therefore not within the reach of an average foundry. This was one of the reasons why BSCRA had adopted the Hexhlet dust sampler.

Use of Marble Powder

Mr. A. Dunlop (W. J. Hooker, Limited) then asked whether Mr. Stoch had seen a reference to the use of marble dust instead of iron powder for cutting stainless-steel.

Mr. Stoch said that he had not, but understood that the Russians were using fine silica powder for that purpose in order to form a lower melting-point compound between the chrome oxide and the silica. They claimed that it was effective and, of course, much cheaper than iron powder.

Mr. Dunlop asked whether there was any health hazard in using marble powder.

Mr. Stoch replied that in normal powder washing there was an excess of iron oxide, which tied up the silica, but if there was an excess of silica, or of marble, it was best to be careful, because some of it might become airborne.

Introducing Conference Paper Authors

Mr. C. M. Stoch

Mr. C. M. Stoch, whose paper to the first BICTA Conference—and the discussion of it—occupies the preceding six pages, was born in Poland and obtained a university degree (Dipl. Ing.) in metallurgy in Krakow in 1937. Subsequently he was engaged in the steelmaking department of the Baildon Steelworks, Katowice. In 1939 he was called to the forces and took part in the fighting in Poland, rejoining the Polish Forces in France in 1940 and subsequently in Great Britain. While still in the forces he had the opportunity of studying the steelfoundry industry in Great Britain, and in 1951 he joined the research and development division of the British Steel Founders' Association, now the British Steel Castings Research Association. He was engaged in the plant-engineering and dust-suppression section, and in 1953 he was made responsible for this section. By the end of 1958 he had become also acting head of the steelmaking section. In 1956 he was elected a fellow of the Institution of Metallurgists.

Mr. J. E. Mitton

Another paper presented to the Investment Founders' Conference, that by Mr. J. E. Mitton, begins on the following page. Mr. Mitton was educated at Kilburn Grammar School, matriculating in 1946. He then joined the British Oxygen Company, Limited, as a junior chemist, being engaged on chemical and metallurgical analysis. He continued part-time evening study at Willesden Technical College and obtained Inter B.Sc. whilst employed with the British Oxygen Company, Limited. In March, 1950, he joined D. Napier & Son, Limited, as junior chemist in the investment-foundry laboratory, and continued part-time study at Acton Technical College. He was promoted to senior chemist in 1953, in charge of the investment-foundry laboratory, and also responsible for chemical control of investment-casting processes. Mr. Mitton obtained a B.Sc., special degree in chemistry in 1954 as an external student of London University. In 1955 he left his firm to do National Service in the RAF, rejoining Napier's in 1957 as chief chemist in the investment foundry. He is at present engaged on technical control and development work, mainly on the refractories [illegible] process.

Process Control in the Investment Shop[*]

By *J. E. Mitton*

The very nature of the various methods and techniques used in investment casting is such that some degree, usually a large degree, of technical control is essential for the smooth and efficient working of the process. Technical control includes, first, the work done by the laboratory in making sure that materials used in the process are up to standard and conform to laid-down requirements, and that conditions in the shops are correct, and, second, the work of the process-control department in seeing that the job is done in the right way.

Investment casting involves a very large number of variables, the control of which can become quite difficult. New ideas are continually being developed, tried and eventually incorporated into the process, together with new materials. A new casting may require only a slight modification of the routine method in order to achieve the best result, but this may give rise to a new defect.

First Principles

Small changes are easily forgotten, and so the first essential of technical control is the keeping of accurate records of all routine checks made by the laboratory, and of all experimental work done in production. These records should be made at the time of doing and not later from memory, which very often turns out to be guess-work. To control any one particular part of the process properly it is necessary to have an overall knowledge of all stages of the process, so that difficulties that may only affect the casting stage or even the cutting off of components may nevertheless be appreciated right at the start. When a new job is to be made or a new set-up is to be tried, the method of attack will have to be decided: Will it be better in an investment mould or in a shell mould? Which dipcoat will give the best surface finish? What about mould and casting temperatures? If we set it up this way, can it be cut off easily and without damage to the casting? These questions will have to be discussed and answered at the outset by those concerned, and by the persons who will have to control the process and see that the best results are obtained from each section.

Process-control Card

When such details have been decided on, and those concerned have a clear idea of any difficulties that are likely to occur, the relevant facts are best entered on a suitable process-control card, which should accompany the job on its journey through the system and be a clear set of instructions to the operators. Further facts may be added to this card where necessary. Then, in the event of any casting defect, the job of tracing where the fault occurred will be made easier, and a full record will be available for reference in the event of the job having to be repeated. Troubles frequently occur through an accumulation of small changes, which individually often go unnoticed until the percentage of scrap leads one to inspect part process-control cards. The reason for the trouble is then usually obvious.

Design Factors

This paper is concerned with technical control as applied in the investing shop; this is, from receipt of the wax cluster for dipcoating to the point at which the finished mould—be it invested or shelled or both—leaves the investing shop to be dewaxed prior to casting. The completed wax cluster will have been designed primarily with a view to obtaining a metallurgically sound casting, and secondly to provide a shape that can be handled and made into a shell or mould without too much trouble. Unfortunately, these two factors do not always go together, but much can usually be done to make the job of the investing shop easier. Complication of shapes seems to be continually increasing, cored sections get larger, and smaller in cross-section, and at first sight a job may seem to offer an almost impossible task in mould-making. Several methods may have to be tried, frequently combining two or more techniques; and in these cases it is essential that there should be close liaison between departments in the design of the set-up. It is not much good having a beautiful casting if it cannot be cut off the runner without damaging it! A mould is useless if the wax members are so close together that mechanical breakdown of the mould material will occur, giving rise to refractory inclusions in the casting.

Temperature and Humidity Control

In the investing room itself it is desirable to have some form of air conditioning, so that temperature and humidity can be kept to a reasonable level and as constant as possible. Because of the nature of the process the humidity will tend to be on the high side, but the temperature should be kept close

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[*] Paper presented at the first annual conference of the British Investment Casters' Technical Association (held at Connaught Rooms, *London*, on May 11 and 12). The author is on the staff of D. Napier *& Son, Limited.*

eg. F., and a good circulation of air pro-
A constant temperature is most important
storage of dipcoated clusters, and to a
xtent for the storage of invested moulds
:lled moulds. Quite a small variation in
ture is sufficient to crack and loosen dip-
om the wax surface. This may not be
ately obvious, and indeed can often go
ted to cause a refractory inclusion, or a
defect brought about by binder penetration
wax and dipcoat. It may also result in
finning" along the line of the crack. If
y fine flash is left on the wax the dipcoat
prevented from forming a continuous
; layer, so providing a ready-made line of
s for these types of defect. Should it be
y to clean the wax in alcohol prior to dip-
cal lowering of temperature due to evapora-
the alcohol can cause trouble if the wax
ated too soon after treatment. Shell moulds
be kept at the constant temperature of the
g room right up to the time immediately
le-waxing, to prevent cracking. Thin and
cores are especially liable to fracture. The
plies, but in a lesser degree, to invested
Here, drying proceeds at a very slow
or to dewaxing, and the mould is in a rub-
ate and somewhat better able to take up
all variation in wax volume. Also, con-
of heat to the wax is slower, and it is
r the investment to be encased in a can
dds to its strength.

Binder Life and Dipcoat Drying

ical reaction rates are dependent on tem-
, a fact which influences the gellation time
rs. However, when compared with other
such as the addition of accelerators, the
variations of temperature experienced in
have a relatively small effect on the life
ider. If the humidity of the shop is too
ying rates of dipcoats will be considerably
down. This can cause trouble, especially
peated dipping process where it is advis-
ave one coat dry before the next is applied.
eans of knowing when the dipcoat is dry is
nd in certain cases it is possible to incor-
dye into the dipcoat slurry that will show
unced fading of colour on drying. It is as
n, to take periodic readings of tempera-
l humidity, and for this purpose a con-
recording instrument is preferable. Changes
ly seen from the inked chart, which is
rly desirable over shut-down periods, when
ns may alter considerably.

Control of Raw Materials

e of refractory materials can be quite a
. The aim is to keep them as dry as
before use, and so ensure efficient mixing
s is necessary. In a damp climate this is
, and is often made more difficult by the
; becoming wet during delivery. A large
technical control of lost-wax casting pro-
omes in routine chemical and physical checks by the laboratory. In this way one can keep a check on the incoming new materials of the process, the various refractories, waxes, binder materials, etc., and ensure that the quality of the material does not alter, and that it will do the job one wants it to. Simple sieve-analyses and titrations are adequate for routine purposes, but more elaborate tests can be made at intervals if desired, if there are facilities for doing them.

Sieve Analyses, and Sedimentation Methods

Incoming refractory materials for investments and dipcoats are subjected to a sieve analysis, and the same is done for the final investment mix if mixing is done on the premises. Washing the material through the sieves with water gives more consistent results, and in the long run is quicker. Results can be filed away for future reference for as long as is necessary. Suitable limits should be fixed for the final grading, within which the mix is satisfactory for use, adjustments being made should the sieve analysis fall outside these limits. With fine powders, such as those used for dipcoats, a sieve analysis will not give an adequate indication of size distribution, and it is better to carry out a sub-sieve particle-size analysis by one of the sedimentation methods. The results should be plotted graphically for ease of comparison. By these means a check can be kept on the grading of consignments of new material. To relate the grading of particle sizes in a powder and the actual properties of the prepared dipcoat, is, however, a difficult matter, because the properties of the dipcoat probably depend more on the surface chemistry of the material.

Other Tests

Occasionally, checks may be made for permeability and crushing strength on prepared samples of investment. Results tend to be rather scattered, which is probably due to the difficulty of preparing a sample that is representative of actual conditions existing in the larger mould. There is normally no need for a routine chemical analysis of refractory materials to be made. If used investment is reclaimed for further use, the usual sieve analysis should be done after crushing and regrading. It is as well to keep an eye open for any build-up of alkalis derived from the use of sodium or potassium-silicate binders. Examination of mould material that has been reclaimed several times often shows that the particle shape has been considerably altered. Thus, the coarser fraction, instead of consisting of single particles of grog, will consist of smaller particles cemented together, and the particle shape, which may have been quite angular to start with, may become rounder in form and give rise to a weaker mould.

Binder Solutions

With a sodium-silicate investment binder, the usual titrations for acidity and alkalinity are made on the stock solutions and, after mixing, a sample is tested for acidity and adjusted to the desired value. The method of mixing of investment and dipcoat binders is important where there is a likelihood of gellation, such as in the case of a sodium-silicate/nitric-acid binder. The working life of the binder will depend to a large extent on this, especially in the warmer months of the year, when the chances of premature gelling are considerably increased. Efficient stirring with slow addition of components is required, so that there will be no local concentration of acid over alkali or *vice versa*. Binder solutions are best stored at the temperature of the investment room. This is usually quite convenient for dipcoats, but may not be so for the larger quantities of investment-mould binders. In the summer months it may on occasion be useful to have a cooling system for the binder tank, or else the acidity of the binder can be adjusted to give greater stability of solution. Adjustments can also be made in the concentration of accelerator in the binder—it may have to be omitted altogether.

Dipcoat Procedure

Prepared dipcoats should be tested for viscosity. Methods may vary considerably, from timing the discharge of a known volume of dipcoat through an orifice (the flow-cup method), to a refined check with a torsion-wire viscometer. For each method, the procedure and test temperature must be exactly the same if results are to be at all comparable—they do not have to be in terms of absolute viscosity. However, such comparative results can only be obtained for the same type of dipcoat with the same refractory filler; with different fillers, for example, silica and zircon, it is possible to get the same value for viscosity, but the covering power of the dipcoat will be widely different. The bench life of dipcoats varies widely; but it is advisable in all cases to have constant stirring.

Defects in the Wax Set-up

Any defects in the wax set-up may result in a scrap casting, and operators should be trained to give each cluster a quick look over before dipping it in the slurry. Such procedure frequently discovers greasy waxes that may prevent a smooth continuous film of dipcoat forming (especially on sharp corners and welded joints), or little pieces of loose wax sticking to the cluster, in hollow sections, for example—these may be blown off with an air line. Small cavities sometimes appear in wax runners which, if not filled in, can give rise to weak slivers of dipcoat being left in the dewaxed cavity—these slivers will probably fracture a casting and result in a refractory inclusion. These things should all be noticed and put right by final inspection in the waxroom, but since they do escape notice on occasion it is wise to be on the look-out for them all the time. It is more usual now to dip the wax in the slurry rather than spray it on, mainly because of the difficulty of getting the spray into concealed areas. However, an airline can be of assistance in blowing dipcoat into sharp corners, and in eliminating air bubbles.

The Use of Zircon Sand to back the Dipcoat

When using zircon sand to back the dipcoat at *the author's* firm, it was found that if the sand was damp there was a tendency for a build-up of loose sand which could not easily be shaken off before the dipcoat was completely dry. Even then all was not removed by shaking, and it was necessary to give the cluster a light blast with an air line. If this loose sand was not removed before investing or dipping again as the case might be, its failure to provide a good key for the secondary dipcoat or investment caused trouble. This trouble has been prevented now by the installation of a small electric-light bulb in the sanding cabinet. This keeps the sand quite dry but does not raise its temperature to any appreciable degree.

Investment Procedure

When it comes to investing the dipcoated cluster, the actual technique and procedure used will depend on its size and shape. The thickness or "pourability" of the slurry used will have been arrived at largely by past experience. It must be poured into the mould can smoothly—this is often done with the aid of some vibration. Filling of intricate parts is helped by melting the dipcoated surface just prior to investing. If one is using an investment with a range of particle sizes, too thin a slurry will cause excessive segregation of the particles, which may result in a weak mould. Such segregation may be overcome in some cases by the use of materials of differing densities. However, the slurry must be fluid enough to allow free escape of air bubbles. Complete displacement of air is not normally possible unless the slurry is subjected to a vacuum. If a large vibrating-table holding a number of moulds is used, the amplitude of vibration should be increased with loading to try to ensure an equal degree of vibration for each mould. The table should be given a periodic check-over to make sure that it is uniform in action, and that there are no dead points on it.

Mould Strength

The actual composition of the investment slurry as far as particle-size distribution and binder strength go will have been determined by the strength of mould needed, together with permeability requirements. The mould strength can be raised by increasing the percentage of fine material in the investment, with accompanying lowering of permeability, and by using a binder containing a greater percentage of bonding agent. Local strengthening of fragile parts may also be employed—by the use of vitrosil rod, for example. The strength of a multi-dipped shell mould will depend on much the same thing—strength of binder, the number of coats and the grading of the refractory used.

Gelling Agent

If a gelling agent is incorporated into the investment slurry to speed up the gel time, the percentage used should be determined by the laboratory from small-scale tests. It sometimes happens that a mould gels before it is completely packed. The reason will usually be either that some foreign material has got into the investment, or that the gelling agent has been added carelessly. If the gelling agent is incorporated in the investment dry-

premature gelling may also be due to in-
ent mixing. On the whole it is safer and more
enient to incorporate the gelling agent into the
er.

ld Drying

ally, the moulds have to be trimmed and given
riod of drying at room temperature before
dewaxed. In the case of an investment mould
with a water-based binder the rate of drying
om temperature is extremely slow, and over a
d of 24 hours is almost negligible, surrounded
is on three sides by mould can and base
. During this time, however, the gel through-
he mould is gaining in strength, except on the
surface, where most of the dehydration is
rring. It is important, therefore, to ensure that
ient drying time or " hardening " time is given,
at the mould may better be able to withstand
pressures set-up by dewaxing. If for any
n it becomes necessary to store moulds in an
ed condition for any length of time, it is best
op dehydration by sealing them off from the
r to incorporate into the mould material some-
that will prevent breakdown of mould-
rial bond due to " salting out " (this may
en with moulds made using an acid and in-
nic-silicate binder). Needless to say, the
erature should be kept fairly constant during
period.

nowledgment

e author expresses his thanks to D. Napier &
Limited, for permission to present the informa-
contained in this paper, and to colleagues for
tance rendered in its preparation.

DISCUSSION

e CHAIRMAN, Mr. W. Foyers, of H. & F.
se Castings, Limited, called upon Mr. Mason
pen the discussion.

R. A. G. MASON (Deritend Precision Castings,
ted) began by saying that, as far as laboratory
ol was concerned, the tied foundries had an
ntage over the independent operator, because
had large, usually well-equipped, and well-
d laboratories. On the other hand, the inde-
ent organizations probably regarded the labora-
as an unwelcome growth in organization. To
ise the control which Mr. Mitton had out-
would mean a large increase in laboratory
and this would probably be unacceptable to
small, independent operator. Rapid standard
were well established in conventional foundry
, and possibly the establishment of a committee
e British Investment Casters' Technical Asso-
on, to investigate the development of rapid
lard tests, would be advisable.

R. MITTON replied that to exercise the fullest
ible control would not necessarily mean a large
but sufficient facilities would have to be
able. Within the investment shop itself, one
n could easily cope with process control.
ratory staff did not have to be large, but it
nded entirely on what other jobs a laboratory
doing. Rapid test methods for investment materials were desirable.

Different Method of Control

MR. R. TAYLOR (Firth-Vickers Stainless Steels, Limited) then said that he used a method which bore no relationship to the methods outlined by Mr. Mitton. He employed a common production-size mould, 12 in. high, 5 in. dia., with a slight taper. Mounted in that was a simple dummy wax assembly which was deliberately designed to represent the worst possible case. From a central sprue, he had little branches sticking out at right angles, or even at 45 deg., pointing downwards, to give the hardest possible test for the investment mix. The mould was invested in the normal way. The time taken to consolidate on a vibrating table was noted, as this was a valuable indication of packing behaviour. After the usual two-day drying, the mould was cut into two with a high-speed bandsaw and the halves then dewaxed and fired through the mould-firing furnace, then examined for texture. By poking it, he continued, he could see whether the mould was well packed in the difficult areas; whether it was firm, or whether it was so weak that it was not likely to stand up to metal wash. It was possible to see the thickness of fines-accumulation on the top of the mould, and, by the normal knock-out procedure, to find out whether the mould was too friable, or excessively strong. By slicing the mould down from top to bottom, the size, quantity and distribution of entrapped air bubbles, local " bridging " of coarse particles, if any, etc., became visible. Mr. Taylor concluded by saying that he considered this to be a very useful test, and maintained that it was better than any conventional laboratory test.

MR. MITTON agreed that cutting a mould provided much information, and said that his firm did that themselves, and often obtained useful information from sectioned block and shell moulds. They had had made half a mould, with one glass face, and had watched the reaction of the investment packed round a wax cluster. The trouble was that these difficult wax clusters often resembled the job his firm had to make.

Length of Storage Time

MR. H. J. MEERKAMP VAN EMBDEN (Philips Gloeilampenfabrieken) then said that his firm had obtained the impression that storing of moulds was detrimental for a binder. They worked them as quickly as possible, for the strength of the mould was apt to decline. He said that he had heard earlier on of the rubbery state of the mould, which was obtained in the fresh precipitate of the silica gel, and he thought the longer it stood the more it would deteriorate.

MR. MITTON replied that by long storage he meant two days at the most. His firm had found it necessary to store certain types of jobs for two days, particularly those with large curved surfaces. If they did not, they ran into trouble with rippled castings. This was probably due to a too-weak mould on de-waxing.

Cast-to-Shape Ingots for Copper-base Alloys

A number of years ago, for the research department of John Harper & Company, Limited, of Willenhall, a pattern was prepared for the production of ingots designed to fit loosely into crucibles used for experimental melts. The purpose was to secure rapid melting, and a maximum metal charge for each crucible. Now, *Centre Technique des Industries de la Fonderie* have developed and patented a similar system for use in copper-base alloy foundries. The following article is a translation of an article which appeared in the September issue of the *Journal d'Informations Techniques des Industries de la Fonderie:—*

Traditionally, ingots for remelting take the form of small blocks weighing about 20 lb. A simple calculation shows that the total surface area of a charge made up of such ingots is much greater than if the charge is concentrated in one simple mass. This is true for return scrap also, which is even more diverse in character than the ingots. The diversity of shape of the charge satisfied the old idea that it helped upkeep at a time when no real technical aids existed. However, the use of very diverse raw materials led to serious metal loss, directly proportional to the surface of the melting charge. The total surface area of traditional ingots making up a charge is three times greater than that of the metal charge itself, and that of the return scrap (runners, risers, etc.) is ten times greater. A shaped ingot (see Fig. 1), consisting of one metallic mass of the same contours as the inside of the crucible, will therefore bring about a distinct lowering of metal loss.

Advantages of the Shaped Ingot

The initial tests on the shaped ingot were carried out on a laboratory scale, and proved that the loss due to oxidation was reduced to less than half that experienced with normal charges. Since a one-per cent. metal loss raises melting costs by a farthing to a third of a penny per lb., the saving due to the use of shaped ingots is considerable. Naturally, in foundries where metal losses are low, the use of shaped ingots shows less spectacular economies.

Another advantage of the shaped ingot is its labour-saving potential, since stacking of the charge in the crucible, for example, becomes unnecessary. Furthermore, damage to crucibles from wedging of the traditional ingots is avoided. Melting practice is made easier, since less gassing is experienced. The process of reduction is carried out in what is virtually a closed area, and improved mechanical properties of the alloys used have been achieved.

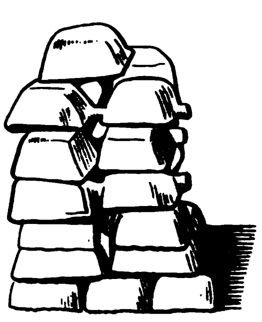

FIG. 1.—*Sketch showing the contrast between traditional ingots (left), and a cast-to-shape ingot.*

Research has also been done on preheating of shaped ingots, which is carried out by suspending them above a furnace and raising their temperature to 400 or 500 deg. C. In this way it has proved possible to reduce melting time by about 25 per cent., thus cutting down costs proportionately.

Book Review

Konstruieren und Giessen (Design and Casting), published, in German, by the Verein Deutscher Ingenieure and the Verein Deutscher Giessereifachleute, Giesserei-Verlag GmbH., Düsseldorf; price DM 18.50.

This book consists of two sections: the first (pp. 1-87) being a series of lectures which formed part of the proceedings of the 23rd International Foundry Congress, held in Düsseldorf in September 1956. The second section (pp. 92-155) is a well-illustrated report about the special exhibition "Design and Casting," which accompanied this educational lecture series, providing actual drawings, patterns and castings from practically all fields of modern foundry technique. A slightly abbreviated translation of the introductory lecture of this symposium: "Advantages of Cast Parts" by Prof. Dr.-Ing. W. Peppler appeared in the FOUNDRY TRADE JOURNAL, February 14, 1957, pp. 203-206. This introduction is followed in the book by a survey on "Recent developments of the casting materials and the possibilities of their treatment," all articles written by eminent experts in this particular field, viz.: (1) Cast Iron (by A. Wittmoser), (2) Cast Steel (by W. A. Stauffer), (3) Malleable Cast Iron (by K. Roesch), (4) Non-ferrous Metals (by W. Büchen) and (5) Recent developments of moulding and casting methods (by R. Schwalbe) (A translated abridged version of the article on "malleable cast iron" was published in the JOURNAL, April 24, 1958, pp. 479-83). The next paper: "Pressure Diecastings" (by F. Lutz) is a comparatively recent addition and was not read at the Congress.

The final chapter (by H. Herschenz) deals with the necessity for co-operation between designer and foundryman. It describes how the designer sets out his ideas on paper and how this initial stage is followed by a chain of experts in patternmaking, moulding, alloying, melting, casting and machining, all of whom contribute to the successful production of a finished article, *e.g.*, a cylinder-block of a motor car. However, in most cases it is clear there is no personal contact between these experts and the designer. These lectures in book form will serve a very useful purpose in helping all who aim at closer co-operation between those responsible for the inception of an idea in the initial design stage and those responsible for its execution—a responsible and often difficult task.

O. P. EINERL.

Prizegiving at Stanton

41st annual prizegiving of the Stanton Iron- Company, Limited, was held on Saturday, nber 21. Mr. J. K. N. Davis, chairman of the tment training and education committee of the il of Ironfoundry Associations, presented the ls; Mr. N. C. Macdiarmid, managing director of anton concern, presided and Mr. W. S. Matthews, g officer, gave his annual report. In this, Mr. ews said that the awards were being made for the of the firm's students during the 1958/9 session, 61 of them had qualified as recipients. This 8 fewer than the previous year, mainly due to duced recruitment of apprentices at all four of mpany's works. The total value of the awards made was £2,646, an increase of £48 compared last year. Although he was not able to report cess at degree level, Mr. Matthews said he was d to announce the gaining of a diploma of the nal Foundry College, by Mr. N. Gadsby, em- d at the Holwell Works. The number of Higher nal Certificates—four—was the same as last year, the number of Ordinary National Certificates ncreased from five to eight. Thirty-seven appren- had gained City & Guilds national certificates, an se of four over last year's total. Taking the works of the company separately, 232 students earned awards at the Stanton works; in the ell area, awards had been gained by 63 students the Holwell works and by 14 apprentices em- d at the local ironstone quarries of Stewarts and ls Minerals, Limited. The Riddings works had nallest group of students and of the 20 who had ied for awards these included a first-class inter- te City & Guilds certificate in patternmaking, hree Ordinary National Certificates in mechanical eering. At the Cochranes works, there was an se of seven in the number of students gaining ls. Concluding his report, Mr. Matthews acknowledged the help and encouragement both he and the students had received during the year from a large number of people, including parents.

Special Awards

The "Scopes" Cup—awarded annually to the most proficient trade-apprentice completing his apprenticeship during the past year—was awarded to Mr. K. L. Bowley, who had completed his term as a moulder at the Stanton works. He had gained a second-class City & Guilds final certificate in foundry practice and had passed the first year of the Ordinary National Certificate in mechanical engineering.

The Joint Staff Committee Prize—awarded to the member of the clerical staff or technical staff showing the most progress during the previous session—went to Mr. J. R. Holt, of the slag laboratory at Holwell, who had gained a Higher National Certificate in metallurgy.

Cochranes' Joint Production Consultative & Advisory Committee prizes—awarded to apprentices making the most progress during the year—were presented to Mr. J. Gittus (apprentice patternmaker who had gained a final City & Guilds certificate in patternmaking), and to Mr. R. H. Robinson (apprentice fitter, who had gained an intermediate City & Guilds certificate in machine-shop engineering).

Cochranes' Foremen's Association Prize was awarded to Mr. J. P. Ibbotson, apprentice patternmaker, who had gained good marks in the first year of the City & Guilds patternmaking course, making 100 per cent. attendance.

Foster Prizes—awarded for outstanding progress in technical education—were presented to Mr. M. G. McGinley (apprentice draughtsman), and Mr. J. Langham (apprentice bricklayer).

Holwell Works Committee Prizes—awarded in the form of books to boys who had made good works' and educational progress—were presented to Mr. J. O. Parker (who had obtained a final City & Guilds certificate in plumbing and his registered plumber's certificate) and to Mr. P. N. Rackham (apprentice plumber who had gained high marks in the first year of the City & Guilds course on plumbing).

Holwell Foremen's Association Prize (consisting of tools to the value of approximately £2)—offered to the older apprentice with the best educational and works' record—was awarded to Mr. R. Garner (apprentice patternmaker, who had obtained a final City & Guilds certificate in patternmaking).

(*Concluded on page 566 at foot of col. one*)

Mr. J. K. N. Davis photographed with the recipients, after the presentation at Stanton on November 21. On the extreme left is Mr. A. Flowers, who received the Gold Award from the Duke of Edinburgh at Buckingham Palace on Nov. 3.

Latest Foundry Statistics

Iron Castings: An improvement in the production of iron castings is shown in figures recently released by the Iron and Steel Board for the third quarter of 1959. The Board states that production in this period was 802,180 tons, an increase of eight per cent. over the total for the quarter in 1958 (742,660 tons). In the first and second quarters of 1958, total output was 961,150 tons and 887,210 tons respectively, whilst in 1959 it was 828,100 tons and 878.590 tons. Details of production by district are shown in Table 1.

TABLE 1.—*Production of Iron Castings by District.*

District.	Third quarter. 1958.	Third quarter. 1959.
Northern	69.520	74,190
North West	81,140	78,310
Yorkshire	80.560	84,650
East Midlands	148.730	173,210
West Midlands	159.820	186,020
Eastern and Southern Counties	77,960	83.800
Scotland and Northern Ireland	69.890	72,030
Wales and Monmouthshire	55,040	49.970
Total	742.600	802.180

Following publication of the Iron and Steel Board's statement, the Joint Iron Council issued a detailed commentary on the figures as below:

As in many industries, output in the third quarter of the year is not comparable with that in any of the other three quarters because holidays are taken at this time. The effect of holidays on production varies, but over the past four calendar years—1955, 1956, 1957 and 1958—output in the third quarter has always been 98,000 tons or more lower than in the preceding second quarter. In contrast, this year the third quarter falls short of the second by only 76,000 tons, and this suggests very strongly that business improved for the industry in the third quarter of 1959 as compared with the second.

General

The figures for the third quarter of 1959 clearly show that the depression which developed in the second half of 1958 has been left behind. The industry, however, has still some way to go before the record outputs of 1955, 1956 and 1957 are reached. The progress made in the third quarter was more widely based than in the second, owing relatively less to the automobile section and more to other sections. Behind the improvement lies increased demand from several ironfounding customer industries whose fortunes have improved, and among these the steel industry, the building industry and public works are particularly noticeable.

Main Sections

A comparison of the output of iron castings in the third quarter of 1959 with output in the third quarter of 1958 is shown in Table 2. The statistics relate to both grey and malleable-iron castings and output is classified according to the main industrial groups purchasing or using the castings.

TABLE 2.—*Output of Iron Castings, by Section.*

Section.	Third quarter (thousand tons). 1958.	Third quarter (thousand tons). 1959.	Percentage change.
Automobile (including tractors) ..	117.5	155.5	+32.3
Engineering*	257.9	256.8	− 0.4
Building and domestic	109.4	123.1	+12.5
Pressure pipes† and fittings ..	104.2	125.7	+20.6
Ingot moulds‡	77.3	91.4	+18.2
Railway equipment	76.4	49.7	−34.9
Total	742.7	802.2	+ 8.0

* Including machine tool, textile machinery, electrical, shipbuilding, etc. † Mainly gas and water. ‡ Mainly for the steel industry

The only section which has shown a significant reduction in output compared with 12 months ago is the railway-equipment section, and this in terms of tonnage produced is the smallest of the main conventional divisions into which total output is classified. However, the engineering section remains virtually unchanged and this is partly explained by the continued weakness in demand for castings for ships' engines, boilers and other items of heavy capital plant. The automobile and the building sections show marked improvement, while the output of pressure pipes and ingot moulds not only exceeded that of the third quarter last year but, despite the holiday influence, virtually equalled the output of the previous quarter.

Labour

The number employed in the ironfounding industry at the end of September 1959 was 125,000, and whilst this is 1,700 more than three months ago, it is still 3,200 fewer than at the end of September 1958.

Prizegiving at Stanton

(*Continued from previous page*)

Riddings Works Committee Prizes in the form of books were awarded to Mr. J. Bradley (apprentice turner, who had gained an Ordinary National Certificate in mechanical engineering) and to Mr. T. Weightman (apprentice patternmaker, who had gained an intermediate City & Guilds certificate in patternmaking).

Stanton Works' Committee Prize (consisting of tools) was presented to Mr. J. Chilton, apprentice boilersmith, who obtained high marks in the first year of the City & Guilds course in sheet-metal work.

Stanton Foremen's Association Prizes (in the form of books or tools) were awarded to Mr. R. Wheat (apprentice fitter); Mr. J. T. Turley (apprentice moulder) and to Mr. M. S. Pickering (apprentice joiner).

Earlier on the same day, at another ceremony, Mr. Davis also presented awards to 18 boys taking part in the Duke of Edinburgh's Award Scheme (see *illustration* on previous page).

Excessive Overtime Summons

Five AEU members who work at the Brightside Foundry, Sheffield, have been summoned to appear before the union's Sheffield District Committee on December 8, to face a charge of working excessive overtime. It is alleged by two shop stewards that the five men refused to carry out their instructions not to exceed the 30 hours-a-month overtime agreement between unions and employers.

At a mass meeting of workers held in the last week of November, the two stewards were ordered to apply for a suspension of the overtime limit at the works, and subsequently the District Committee lifted the restriction for three months. It is claimed that suspension of the restriction would have been justified before the application was made. The five workers concerned, claim that they exceeded the limit because they were engaged on special contract work and they took the view that management was entitled to ask for overtime when necessary to enable the firm to meet delivery dates.

Raw Material Markets

Iron and Steel

ness at the ironfoundries continues to expand verall production of castings is increasing. This s particularly to the engineering and speciality ries, which continue to receive orders for appre- tonnages of high-duty castings. While demand some trades, including collieries and railways, v to recover its former level, the foundries sup- the motor vehicle trade are very busy.

call for castings from the machine-tool industry ues to improve and many of the foundries cater- incipally for that trade are now better employed. heavy engineering, power and electrical plant , steelworks, and others are using substantial ges of castings, which provide the foundries with ent work to enable them to obtain outputs at ctory levels.

production of high-quality castings the pig-iron used is in the low-phosphorus grades, averag- 2 per cent. phosphorus content, although fairly ntial tonnages of hematite are also utilized, to- with some of the refined irons. With the recent se in demand, the availability of some brands of w-phosphorus irons is becoming more restricted roducers are finding it necessary to allocate es to the foundries to ensure fair distribution. nd for hematite is also expanding and producers ow more easily dispose of outputs.

improved call for high-phosphorus pig-iron tes a continued increase in demand for castings ich this iron is required. Some of the engineer- oundries using this grade are specifying more for supplies, and steady demands are made by ght and jobbing foundries. The supply position high-phosphorus pig-iron is comparatively easy part from the requirements of the home found- makers are able to continue to undertake such as business as can be obtained. The increas- ll from the steelworks for basic pig-iron is being tisfactorily.

scrap market is very active with an intensive d for the better and heavier grades of cast-iron Foundry coke is being delivered in sufficient ties, and ganister, limestone, and firebricks are available.

re-rollers continue to be very busy and their oncern at present is to secure sufficient quantities l semis to undertake the work on hand. There trong demand for small bars and light sections, e mills producing reinforcing rods are very busy. me working at most of the re-rollers is assured me time ahead, provided adequate quantities ets, etc., can be obtained. Home steelworks are y committed for their outputs, which generally ort of the re-rollers' present requirements for nption and stock.

Non-ferrous Metals

per continues to be a hesitant market on both of the Atlantic. In London the central point to ed is that cash copper is relatively scare and ands a material premium over three months' Yet consumer buying is patchy, with the that the undertone is still sensitive and more so news than to bullish reports.

situation appears to be common to the conti- market centres, and all suffered last week, first lowering of the Belgian price, secondly by the increase in LME stocks, and, finally, by the released in the United States concerning domestic consumption of copper in October. These figures showed that brass and wire mills and foundries —based on their shipments of fabricated products in October—consumed 100,302 tons, compared with 116,880 tons in September. New business was also down, 102,746 (131,687) tons. Moreover, stocks in the hands of fabricators at the end of October amounted to 431,612 tons, against 462,880 tons, with orders on hand with producers at 119,806 tons, compared with 116,675 tons in September. Nevertheless, the report that Japan is considering importing about 9,000 tons of electrolytic copper to relieve the shortage and also to curb domestic copper prices put the London market better.

The US position is much the same as before. None of the copper companies on strike have reached an agreement with the Mine, Mill and Smelters' Union. There is still no quotation for the custom smelters and the producers' price is unchanged at 33 cents a pound. The outlook is not clear. London is now waiting further developments from the United States and the same can be said about every other market centre, including New York.

Tin is moderately steady, with consumer interest sporadic. However, demand from the Continent has improved. It is difficult to know how much the present price level owes to activities by the buffer stock manager. Tin production in Malaya has increased perceptibly, the figure for October being 3,478 tons, which is 14.4 per cent. higher than that achieved in September. For the first 10 months of this year output amounted to 29,559 tons, a drop of only 13.7 per cent. on the corresponding period a year ago. Indications from Malaya, particularly the budget item for tin export duties next year which provides for the export of 60,000 tons, suggests that tin controls will be relaxed considerably next year. In the United States demand is still below par and the price is under $1.01 a pound.

Lead is little changed, with the price now struggling to keep above £70 a ton. Growing opposition to the US lead and zinc quotas is seen in a representation of six US companies to the US Tariff Commission to rescind quotas in favour of import duties. Lead is quiet in the United States and the price is unchanged at 13 cents a pound.

Zinc is a reasonably active market. Some observers feel that the recent shortage of metal has now come to an end. The Board of Trade is thought to have about 6,000 more tons to dispose on the market should that be necessary or desirable. Markets in any case are now running into the Christmas period and a slackening of activity is looked for. The US market seems to be waiting for the outcome of the present steel negotiations for an overall settlement before taking a strong line in the market. Meanwhile, the quotation is called 12½ cents a pound for East St. Louis spot.

Reorganization of a Fettling Shop. It is regretted that an error appeared in the article under this title appearing in the October 29 issue of the JOURNAL. On page 379, column one, line 24, the figure quoted for air consumption should have been 100 cub. ft. per min. instead of 1,000.

A ONE-TON PER HR. CUPOLA and a 400-lb. oil- or coke-fired crucible furnace are amongst the requirements listed for India. Details are available from the Board of Trade, Lacon House, Theobalds Road, London, W.C.1, quoting reference number ESB/28280/59.

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

December 2, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron). Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C.* 1s. 9½d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 6d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £88 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £248 0s. 0d. to £248 10s. 0d.; three months, £237 15s. 0d. to £238 0s. 0d.; settlement, £248 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 4d. per lb.; rods, 258s. 0d. per cwt. basis; 20 s.w.g., 293s. 0d. per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £790 0s. 0d. to £791 0s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—First half December, £72 5s. 0d. to £72 7s. 6d.; first half March, £72 5s. 0d. to £72 7s. 6d.

Zinc.—First half December, £95 5s. 0d. to £95 10s. 0d.; first half March, £90 5s. 0d. to £90 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 15s. 0d.; rolled zinc (boiler plates), all English destinations, £128 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 11½d. per lb.; sheets to 10 w.g., 209s. 9d. per cwt.; wire, 2s. 9½d.; rolled metal, 209s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £159; B6, £211.

Brass (High Tensile).—BS1400, HTB1, £198; HTB2, £208; HTB3, £222.

Gunmetal.—BS1400, LG2, £198; LG3, £207; G1, ½%, £263; G1, 1%, £252.

Phosphor Bronze.—BS1400, PB1 (AID released), £295; BS1400, 90/10/1, £282.

Leaded Phosphor Bronze.—BS1400, LPB1, £217.

Phosphor Bronze Strip, etc.—Strip, 294s. 9d. per cwt.; wire, 4s. 1½d. per lb.; rods, 3s. 4½d.; tubes, 3s. 4½d.; chill cast bars; solids 3s. 4½d.; cored 3s. 5½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent. ½ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. to £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £243; AB2, £253.

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* Average 68–70 per cent.

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AEI Reorganization

Reorganization of Associated Electrical Industries, Limited, is virtually completed with the formation of five new product divisions. From January 1 the names of famous companies will be changed. The British Thomson-Houston Company, Limited, will be known as Associated Electrical Industries (Rugby), Limited, the Metropolitan-Vickers Electrical Company, Limited, will become Associated Electrical Industries (Manchester), Limited, and the new name for Siemens Edison Swan, Limited, will be Associated Electric Industries (Woolwich), Limited.

Five new product divisions of AEI are announced. The cable division and the construction division combine the interest of the cables division of Siemens Edison Swan with those of W. T. Henley's Telegraph Works Company, Limited, and Liverpool Electric Cables, Limited. The new telecommunications division has hitherto traded as a product division of Siemens Edison Swan. These three divisions, together with the radio and electronic components division, will be managed by Associated Electrical Industries (Woolwich), Limited.

The fifth division—the instrumentation division—combines the interests of Sunvic Control, Limited, with the instrument and meter, X-ray, and scientific apparatus departments of Metropolitan-Vickers and will be managed by Associated Electrical Industries (Manchester), Limited.

From January 1, therefore, the total of AEI product divisions to be established becomes 12. The famous companies whose names are to change will cease to trade, but will manage a number of AEI product divisions. Their employees will be transferred to AEI employment.

Birlec, Limited, the heat-treatment and furnace manufacturing company, will be renamed AEI-Birlec, Limited, and will be managed by Associated Electrical Industries (Rugby), Limited.

Referring to the changes at a London Press conference last week, Lord Chandos, the AEI chairman, said that the group hoped to gain economies from the reorganization because of longer runs of products and the transference of short runs to specialized plant. There would be little physical moving of plant or equipment from one area to another. The divisions would have the greatest degree of autonomy as was practicable to pursue a common policy, but all finance would, of course, continue to be run from the central headquarters of the AEI group.

Duties Reduced on Imported Machine Tools

Reduction of the import duty on machine tools from 17½ per cent. to 10 per cent. *ad valorem* was announced in the House of Commons on November 24 by Mr. Reginald Maudling, President of the Board of Trade. The reduction became effective on November 25. The system of refunding the duty in certain cases has been ended.

Hitherto, a user who had paid 17½ per cent. duty on an imported tool could get the duty remitted if he could establish that no comparable machine was obtainable from the domestic industry or that the delivery date was too long. Under this system, nearly all imported big machines were freed from duty.

The announcement has been welcomed by the Machine Tool Trades Association, which originally proposed the system now adopted by the Board of Trade.

Export Opportunities

The Export Services Branch of the Board of Trade, Lacon House, Theobalds Road, London, W.C.1, record that Mr. D. N. Macconel, the president of Machinery Sales Company (Inc.), 2838 Leonis Boulevard, Vernon, Los Angeles, has informed the British Consulate-General at Los Angeles that his firm would like to represent United Kingdom manufacturers of die-casting machines.

Firms interested in this enquiry should write by air mail direct to Mr. D. N. Macconel. It is important that any quotations should show f.o.b. and c.i.f. prices in US currency. It would be appreciated if responding firms would copy their initial correspondence to the British Consulate-General, 448 South Hill Street, Los Angeles 13, California, to enable the enquiry to be pursued.

It is also reported that tenders are invited by the Central Trust of China, purchasing department, 68, Yen Ping Nan Road, Taipei, Taiwan, Formosa, for the supply of a sand mill for mixing and kneading moulding sand; sand blender, capacity 175 cub. ft. per hr., 2 h.p. motor; mould-hardness tester; a permeability tester, scale 0-10,000; hand-operated sand rammer; sand bond tester, 1/20 h.p. motor; and a trolley ladle with lift capacity 90 kg. The project implementation order is No. 434-61-460-9-90121, and the invitation number US-588-1. United Kingdom firms who wish to tender should if possible obtain the necessary documents direct from the Central Trust of China. A copy of the specifications, etc., is available for inspection at Lacon House, Room 619, and photo-copy sets of the documents can be obtained at a cost of 4s. All quotations should be made in US dollars as quotations in sterling cannot be considered, and manufacturers should make a firm price quotation as bids quoting "prices ruling at time of delivery" are automatically disqualified. The closing date for the receipt of tenders is December 22. The BOT references numbers for these enquiries are ESB/27296/59 and ESB/27671/59/ICA respectively.

ECGD Cover for Confirming Houses

New policies covering confirming house business were introduced by the Export Credits Guarantee Department on December 1. The policies provide substantially the same cover as the present policies covering sales, but on renewal of a policy, the existing types of guarantee will cover only sales, and merchants will be required to cover confirming business under one of the new policies. No option will be created to cover only sales, or only confirming business, and merchants will (as hitherto) be required to cover both sides of their businesses for the same period and on the same basis—either both from date of contract or both from date of shipment. Until the renewal date of a one-year policy, or until the next "year-point" in a three-year policy, merchants' confirming business will continue to be covered by existing policies.

THIS YEAR the George Cohen 600 Group is 125 years old. Founded in 1834 by George Cohen, it was then a modest business in London for "the purchase and sale of scrap cast and wrought iron." To-day, the 600 Group serves the metallurgical and engineering industries of the world. Its turnover is some £30,000,000 a year; it has over 30 subsidiaries at home and overseas; and it employs assets of about £17,000,000.

Notes from the Branches

London

Mr. F. Hudson, F.I.M. (of the Mond Nickel Company, Limited), and Mr. E. C. Mantle, M.SC., F.I.M. (of British Non-Ferrous Metals Research Association), were the joint lecturers at the October meeting of the London branch of the Institute of British Foundrymen, held at the Constitutional Club, Northumberland Avenue, London, W.C.2. The meeting was well attended and members of the Association of Bronze and Brass Founders and the British Bronze and Brass Ingot Manufacturers' Association came along at the invitation of the branch. The evening's lecture was "Specification Requirements for Gunmetal Castings."*

The revision of specification B.S.1400 for copper-base castings has given rise to controversy, particularly between founders and ingot manufacturers, and this meeting was arranged to try and resolve some of the differences involved, keeping in mind the future requirements of the user of gunmetal castings. The speakers dealt with such matters as future outlook for gunmetal castings, specification details, testbars, properties of castings, inspection methods, and hall-marking of quality castings.

Before calling upon Mr. Hudson to give his contribution, Mr. D. A. C. Hutchison (senior vice-president of the branch who was deputizing for Mr. J. Bain, the president), gave a special welcome to Mr. J. Vanick, a celebrated non-ferrous metallurgist from the United States, and an officer and medal winner of the American Foundrymen's Society. He also voiced the branch's welcome to members of the ABBF and the BBBIMA who were present and asked them to participate freely in the proceedings.

Mr. Hudson then gave his contribution which was illustrated by slides. He pointed out the need for an all-out sales and propaganda effort for the increased sale of copper-base castings which, he said, was on the brink of a similar decline per head of population as in the USA. He then went on to detail the proposals for the changes to B.S.1400, mentioning the incorporation of nickel or the adoption of the British Non-Ferrous Metals Research Association's alloys to meet the new demands of industry. Mr. Hudson gave his own laboratory's results in modifying the composition of gunmetals of the 85/5/5/5 type.

Mr. Mantle's contribution was divided into three sections, *viz.* (*a*) alloys, (*b*) commercial gunmetal specifications, and (*c*) test-bars. When dealing with the properties of alloys, the speaker referred to graphs and text of a leaflet, prepared by the BNFMRA, and which had been circulated to members present at the meeting. He showed slides and described the alloy properties, *i.e.*, casting *versus* test-bar properties. He said that the BNF gunmetal, with a composition of Cu. 87½, Sn. 7½, Zn. 2, and Pb. 3 per cent. was considered better for use when producing castings with thick sections. He confirmed generally the statements made by Mr. Hudson regarding nickel-containing alloys, but said that sufficient work had not yet been done on this point. Dealing with commercial gunmetal specifications, he enumerated some founder/user reactions arising from their use. Regarding test-bars, Mr. Mantle said more guidance was needed and the test-bar type should be fully specified. The results of tests in member foundries were shown by slides.

This concluded the Authors' contributions and the meeting was then opened for discussion, members of the ABBF and BBBIMA joining in. (These proceedings will be reported later). Mr. A. R. French, in proposing the vote of thanks to the lecturers said there was a real need for improvements in non-ferrous alloys to meet the demand of industry. It had been shown that even small changes in alloy composition had a wide effect. Mr. W. R. Buxton seconded, and the meeting was then closed.

East Anglian Section

On November 13, members and friends of the East Anglian section met again at the Oriental Café, Ipswich, for their annual dinner and social function. They were honoured by having Mr. J. Bain, the London branch president, together with Mr. A. R. Parkes, the secretary, as their guests. Mr. Bain responded to the toast "The Institute of British Foundrymen" coupled with the "London Branch" which was proposed by Mr. H. A. Wincer. The toast "The East Anglian Section" was most ably proposed by Dr. D. V. Atterton, of the Birmingham branch, the response being given by Mr. T. D. Oughton, section president. After dinner, light relaxation was provided by the Benny Lyon Show which certainly produced first-class entertainment. Mr. A. M. Whipp brought the evening to an official close by proposing a vote of thanks to Mr. V. W. Child, on whose shoulders fell the work of organizing the function, also to Mr. L. A. S. Harbourne (toastmaster) and to the artistes for their fine performance.

Speakers at the annual dinner of the IBF East Anglian section, held in Ipswich on November 13.

Left to right: Dr. D. V. Atterton, M.A., vice-chairman of the Institute's Technical Council; Mr. A. M. Whipp (section past-president); Mr. T. D. Oughton (section president); Mr. J. Bain, A.M.I.MECH.E. (London branch president), and Mr. H. A. Wincer (previously section secretary).

[*Courtesy*, *East Anglian Daily Times*

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* Paper shortly to be printed in this JOURNAL.

News in Brief

According to the Barclays Bank D.C.O., *Overseas Review* for November, Automotive Products Company, Limited, are to establish a factory at Isando, east of Johannesburg, South Africa.

Six members of a productivity team from Japan visited the works of the Wolverhampton Die Casting Company, Limited, on November 23, and also the Birmingham factory of Fisher and Ludlow, Limited.

The Board of Trade has issued a reminder that the Open General Licence permitting exports of specified types of iron and steel scrap expires on December 8, and states that this licence will not be re-issued.

About 1,000 employees of the Star Aluminium Company, Limited, Wolverhampton, are to work a shorter week from January 1, when hours will be reduced from 44 to 42 without loss of pay. The company manufactures aluminium foil.

The late Professor F. C. Lea, who was head of the Department of Mechanical Engineering in Sheffield University from 1932 to 1936, is to be commemorated by naming the strength of materials laboratory in the Department, the F. C. Lea laboratory.

The three bells in the tower of St. Mary's parish church, Stretton-cum-Wetmoor, Staffordshire, are to be dismantled, melted down and recast into a peal of six bells because they are too heavy to handle. An appeal for £980 to cover the cost of the work, has been made by the Vicar, the Rev. D. B. Laughton.

Extensions to the factory of British Acheson Electrodes, Limited, at Clay Wheels Lane, Middlewood, Sheffield, are alleged to be the cause of " smoke, fumes and noise " in a protest petition by local residents, sent to Sheffield Corporation, Wortley Rural Council and Mr. John Mendelson M.P. for Penistone.

The Mint, Birmingham, Limited, is minting around 17,000,000 coins in readiness for Nigeria's Independence Day next October, this being part of the Royal Mint's order for over 1,000 million coins for Nigeria with a total face value of some £35,000,000. The Mint, Birmingham, is making 4,998,000 bronze pennies and 12,000,000 shilling pieces.

Leasona Holt, Limited, engineers, Rochdale, are to move to the premises of a cotton mill in Heywood, which is closing down. When the move is complete about 800 people will be employed instead of the present staff of 300. The firm, which has operated in Rochdale for over a century, was recently acquired by the Leasona Corporation, Limited, of America.

The Industrial Training Council has approved grants to three industrial organizations to assist them to develop arrangements for training young people in their industries. The grants, the first to be made out of the Government's grant-in-aid of £75,000, announced last May, will go to the Cotton Board, the Booksellers' Association and to the Hotel and Catering Institute.

The Midlands, Cheshire, Lancashire, Yorkshire, the western counties, and Wales will be served by a new branch office opened at Lloyds Bank Chambers, 85, Regent Street, Leamington Spa (Warwickshire), by the Bedford mechanical, hydraulic, and electrical engineers, W. H. Allen, Sons & Company, Limited. Mr. J. C. C. Whyte, formerly technical representative for the west Midlands and mid-Wales areas, has been appointed manager of the new office.

When the 250,000th vehicle came off the line on November 24 at the Rover Company, Solihull, Mr. G. Lloyd Dixon, executive director (sales) forecast a speed up in production of the Land Rover. He said that it had taken 11 years to reach the quarter-of-a-million figure, but present production rates indicated that the half-million stage would be reached in only another six years. Land Rovers had earned more than £87,000,000 in export markets.

Production in some sections of Midland industry has increased rapidly in recent months and is beginning to outstrip the steel supply it was stated on November 17, at the Press conference following a meeting of the Midland Regional Board for Industry. Major C. R. Dibben, chairman of the Board, said that the upward trend was continuing. There was a shortage of labour in some cases and in others there was a shortage of raw materials especially sheet steel. Although October had been a record month for steel production, the Board had received several reports of production being held up because of sheet-steel shortage. The general atmosphere, however, was one of buoyancy.

Thos. Firth and John Brown, Limited, Sheffield, are to provide a new shop for apprentice training which will increase the present capacity by 50 per cent. it was stated by Dr. C. Sykes, managing director, when presenting prizes to more than 100 apprentices at the works on November 20. Dr. Sykes went on to say that there would be excellent opportunities for fuel technologists in the future, the reason being that fuel costs were an increasing proportion of production expenses and this together with the implementing of the Clean Air Act would mean more highly-developed plant. Mr. G. May establishment and welfare officer, said that a special course was being introduced for those who wished to specialize in fuel technology.

Any setback in sales of British motor-cars to the United States and Canada would have " the most serious repercussion " in Britain, says Mr. A. B. Waring, chairman of Joseph Lucas (Industries), Limited, in his annual statement to shareholders. For that reason he adds, the high concentration of British car business in North America is " to some extent a cause for concern." The increase in British car sales to North America from 50,000 to more than 250,000 a year in five years, however, reflects the highest credit on British manufacturers. Mr. Waring says that there is every indication that the road vehicle industry will break all previous records in both the home and export markets in the coming year. He forecasts a decline in the aircraft industry and expects that the tendency for non-ferrous metals and other raw materials to rise in price may continue.

At the meeting of the Birmingham Chamber of Commerce on November 23, the Road Traffic Section of the Chamber presented a report which urged that the Minister of Transport should give priority to the extension of the London-Birmingham motorway into Lancashire, with adequate connecting roads to the docks at Manchester, Liverpool and Birkenhead. The report stresses that quicker access to the ports from the Midlands is imperative if manufacturers are to secure more overseas trade. The problem of traffic congestion in the industrial Midlands is described as one of the most serious in the country. " It is obvious that the most urgent measures are needed to deal with the situation " the report says. The Road Traffic Section of the Birmingham Chamber also supports a proposal from the Wolverhampton Chamber of Commerce that large parking spaces should be provided near the London end of the M1 road. It suggests that car parks should be selected near stations on the Northern Line of the London Transport system giving access by rail to central London.

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Personal

Mr. J. Lauchlan who is managing director of Craven Brothers (Manchester), Limited, has been appointed chairman of the company.

Mr. H. Morley, general works manager of Samuel Fox & Company, Limited (a subsidiary of the United Steel Companies, Limited), has been appointed a director of the company.

Mr. J. E. Armitage has been appointed commercial director of Vickers-Armstrongs (Aircraft), Limited, in succession to Mr. J. Anderson, who has retired on account of continued ill health.

Sir Leslie Rowan, finance director of Vickers, Limited, is to head a standing committee on policy towards under-developed countries set up by the Federation of British Industries.

Mr. Roland Gidley has been elected president of the British Association of Machine Tool Merchants in succession to Mr. Sidney Plastock. Mr. W. E. Norton was elected vice-president and Mr. E. J. F. Bradley was re-elected honorary treasurer.

Mr. E. O. Prichard has been made southern-regional manager and Mr. W. L. S. Hatton has been appointed senior representative in the same area for Foundry Services, Limited. Mr. Prichard has been in the south for five years, but Mr. Hatton is newly transferred from the Bristol area.

Mr. John C. George, m.p., chairman of Joy-Sullivan, Limited, coal-mining machinery and compressed-air equipment manufacturers, has resigned from the board on his appointment as Parliamentary Secretary to the Ministry of Fuel and Power. Mr. George joined the board in 1950 and became chairman in 1952.

Mr. F. W. S. Hewitt, northern regional sales manager of Domestos, Limited, College Works, Albion Row, Newcastle-upon-Tyne, has been appointed southern regional sales manager of the Industrial division of the company. His former position is taken by Mr. J. Spence, Newcastle branch area manager. Mr. J. Harrison succeeds Mr. Spence.

Mr. Thomas Grainger, London manager of Ashmore, Benson, Pease & Company, manufacturers of gasworks and blast-furnace plant, etc., of Stockton-on-Tees, has received a presentation to mark his retirement. He joined the firm in 1907 as an office boy, leaving for seven years after the 1914-18 war. He later returned to work on gas-cleaning plant and joined the company's London staff in 1937.

For Sir Charles Goodeve, f.r.s., a visit to Canada means a return to his native land, for he was born there in 1904. On Monday last he began a fortnight's visit to Canada and the United States. His busy programme includes a two-day symposium to be held by the General Motors Corporation on "The Theory of Traffic Flow." The application of operational research to street traffic is a subject that has long interested the director of the British Iron and Steel Research Association.

Among the 16 men who received long-service awards from Lord Riverdale, chairman and managing director of Arthur Balfour & Company, Limited, Sheffield steelmakers, recently, was his brother, the Hon. F. H. Balfour, a director of the firm. Longest serving employee is Mr. A. Lindsay (68), one of the original crucible moulders, who has 40 years' service. Those with 35 years' service include Mr. Balfour, Mr. H. Crapper, manager of the production department, Mr. P. McNab, manager of the Birmingham branch office, *and Mr. R.* Whitehead, tool division.

Obituary

Mr. James Shearer, head of the firm of Shearer Brothers, metal refiners, Glasgow, for over 60 years, has died at the age of 84. One of his sons is carrying on the family business, which has been established for over a century.

Mr. Alfred Archibald Fellows, a well-known figure in the Midland iron and steel trade, has died at the age of 83. He had served on the boards of Lloyds Ironstone Company, the North Lincolnshire Iron Company; and the Islip Iron Company, and he was a partner in Lloyds and Company, iron merchants. Mr. Fellows was a founder member of the Central Pig Iron Producers' Association.

Mr. Cyril Ernest Prosser, a former chairman of the Metals Division of Imperial Chemical Industries, Limited, has died at the age of 66. Mr. Prosser began his career with Elliotts Metal Company and when that company and British Copper Manufacturers, Limited, amalgamated with Kynochs, Limited, under ICI, he became assistant sales manager of the combined metals department. A delegate director in 1936, he later served as joint managing director and finally as chairman of the Metals Division until he retired in 1955 having completed 45 years with the group. During the last world war he was chairman of the Government-appointed panel to co-ordinate supplies of non-ferrous tubes and shell bands.

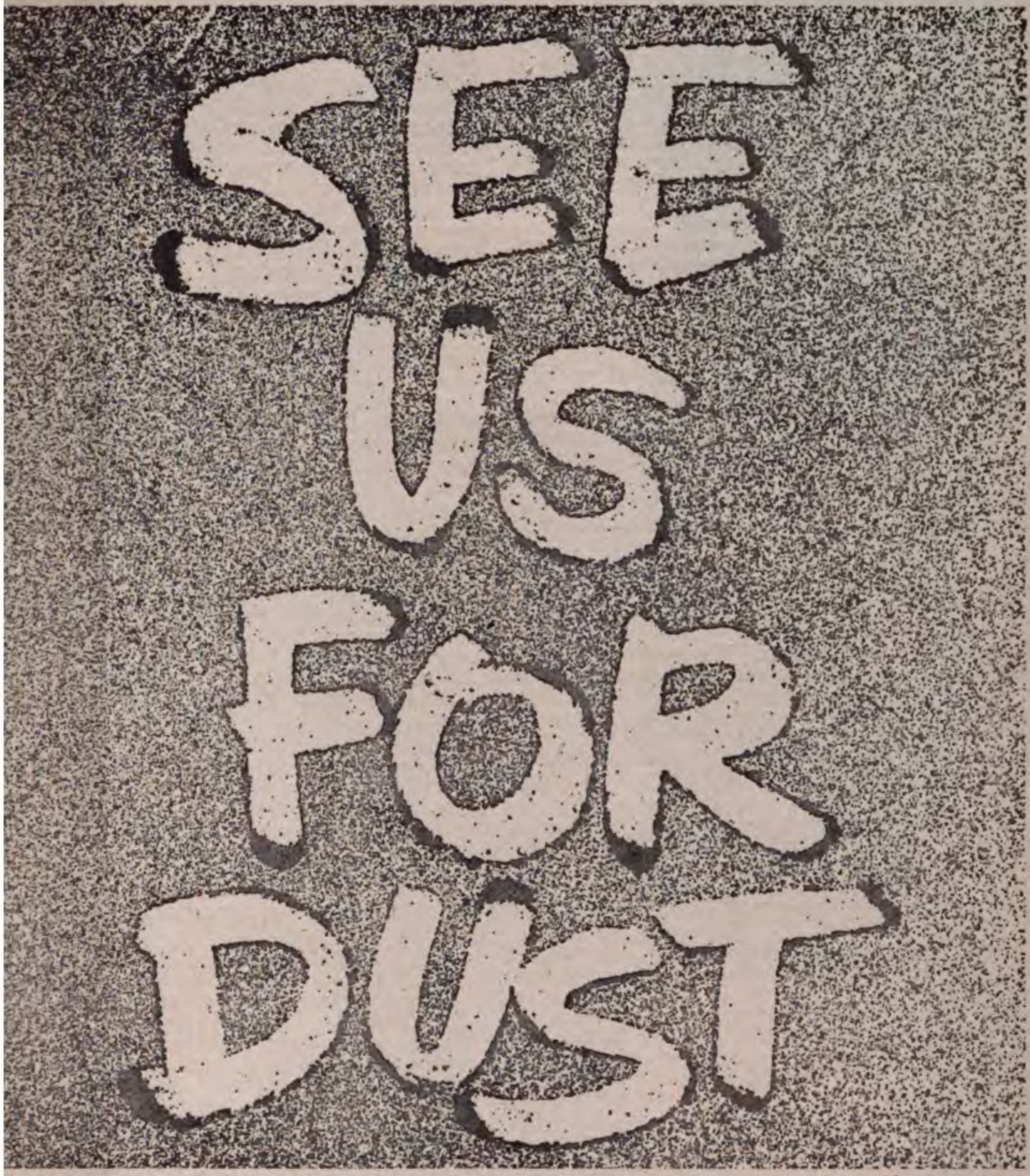
The sudden death took place on Saturday, November 28, of Mr. Dennis Sleath, Midlands-area manager of Borax Consolidated, Limited, a company he joined in 1936. For many years Mr. Sleath was honorary secretary of the Midland section of the Institute of Vitreous Enamellers, a position he still held at the time of his death.

Mr. A. C. Lester, senior partner of Coldbath Foundry, Limited, non-ferrous founders, Islington, London (a company founded in 1920), died on November 29, at the age of 65. Mr. Lester had been an enthusiastic member of the London branch of the Institute of British Foundrymen since 1941.

"The Computer in Production"

To introduce chartered mechanical engineers and managers to the latest techniques involving the application of computers in production, and to provide a forum for managers, engineers, and users to present their views to manufacturers of computers, the Institution of Mechanical Engineers is arranging an informal discussion on "The Computer in Production" to take place at 1, Birdcage Walk, Westminster, London, S.W.1, from March 21 to 22, 1960. The meeting will commence each day at 10 a.m., continuing until 8 p.m. on the first day and to about 4 p.m. on the second day. Several distinguished engineers and users of computers will give talks on the subject, and visits to computer centres and to installations where computers are being used will also be included. The meeting, which will be open to members and visitors, is aimed primarily at management level, but the subject treatment is also likely to be of interest to specialists in computers. Those wishing to attend should apply to the secretary at the address quoted.

Cammell Laird & Company, Limited—Admiral Sir Michael M. Denny, formerly CIC, Home Fleet, and CIC, Eastern Atlantic (NATO), has been appointed chairman in succession to Mr. J. C. Mather, who remains on the board. Mr. Mather, who has been chairman since 1951, expressed a wish to retire after his recent illness.



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Company News

Duport, Limited, ironfounders and engineers, etc., of Tipton (Staffs)—Final dividend for the year to July 31, 1959, is raised to 12½ (7½) per cent., making a total of 17½ (12½) per cent. Group profit expanded to £2,068,960 (£1,432,979).

Power-Gas Corporation, Limited—The company has been holding discussions with Davy and United Engineering Company, Limited, regarding a possible association. Discussions are at an early stage and the outcome will be promptly announced.

Sperryn & Company, brassfounders and finishers, etc., of Birmingham—Group profits in the year ended July 31, 1959, amounted to £88,927 (£69,239) and the dividend is raised to 14 (12) per cent., with a final of 10 per cent. Net profit, after tax of £39,846 (£36,449), is £49,081 (£32,790).

Charles Churchill & Company, Limited, machine-tool makers, of Coventry—A notice has been received by the company of the intention to move a resolution at an extra-ordinary general meeting on December 8 recommending that Mr. G. E. K. Blythe be removed from his office as director.

North Central Wagon & Finance Company, Limited—Dividends are to be resumed with 4s. per £1 ordinary for the year ended September 30, 1959. After interest and tax the group net profit is £816,577 (£493,207 for the previous nine months). Exceptional credits of £95,837 (£21,455) raises the balance to £912,414 (£514,662).

Triplex Foundry, Limited—The company is commencing interim dividends with the payment of 5 per cent. for the year ending March 31, 1960. The 1958-59 dividend was 7½ per cent. Profits, before tax, are approximately £77,000 for the six months ended September 30, compared with £36,000 in the corresponding period of 1958.

John Holroyd & Company, Limited, bronze founders, manufacturers of machine tools and gearing, etc., of Milrow, near Rochdale (Lancs)—Dividend is being raised from the equivalent of 7½ per cent. to 10 per cent. for the year to September 30, 1959. Group net profit is down to £347,542 (£357,322) after tax of £306,772 (£369,310).

Saunders Valve Company, Limited—An increase to 7½ (4½) per cent. in the interim payment for the year ending March 31, 1960, is, state the directors, designed to reduce the disparity between payments and has no other significance. The total for 1958-59 was 17½ per cent. During the current year orders received and sales have been at a higher level than in 1958, the directors add.

Butterley Company, Limited, bridge builders, structural and general engineers, etc., of Derby—A distribution of 3d. per 2s. 6d. share, not subject to tax, out of realized profits, payable December 12, is announced. A capital distribution of 4d. per share was made a year ago and in May it was stated that a further distribution was not recommended, but that the position would be reviewed in October.

Birmingham Small Arms Company, Limited—A difficult year was experienced in the steel division, states the chairman, Mr. J. Y. Sangster, profits falling to a low ebb, but the less favourable results were more than compensated by the improved results in other fields. Group trading profits expanded to £2,469,819 (£2,261,707) in the year ended July 31, 1959, and the dividend is raised to 12½ (11) per cent.

Universal Grinding Wheel Company, Limited—*The dividend is effectively raised to 15 per cent.*, tax *free (equivalent of 12½* per cent.), with a final of 10 per cent. for the year to September 26, 1959. Group trading profits amounted to £808,578, and after tax of £425,696, the balance is £426,889. These are the first group accounts. A year ago the parent company had a net profit of £366,841 after tax of £409,327.

Heenan Group, Limited—Mr. C. L. Hill, the chairman, states that steps are being taken to acquire other engineering or allied businesses and so spread the group's interest in engineering. Negotiations are proceeding. During the second half of the year to August 29, 1959, the group experienced a marked recovery in orders, and the year ended with an order balance of £3,600,000, against the previous year's figure for the present group companies of £4,000,000.

Stothert & Pitt, Limited, engineers and iron-founders, etc., of Bath (Somerset)—The chairman, Mr. R. A. Riddles, states that trading profits for the past year were satisfactory and completed sales reached [illegible] new record figure. All departments were fully employed in the year. The profit margin has fallen slightly and in the competitive trading conditions which now exist, Mr. Riddles feels that the way [illegible] improve profits in the future will be to increase turnover.

Baker Perkins, Limited, manufacturing engineers, of Peterborough—Negotiations are in an advanced state for the acquisition of the refrigeration, bulk handling, and general-engineering side of the business of William Douglas & Sons, Limited, London, S.W.1. The assets used in the engineering activities of [illegible] present company will be transferred to a newly-formed subsidiary which Baker Perkins will acquire [illegible] £260,000 to be satisfied by the issue of the company's ordinary £1 units.

Rotary Hoes, Limited, Rotavator, tractor, trench-digger manufacturers, etc., of West Horndon (Essex)—A rights issue of 400,000 5s. shares at par on a one-for-nine basis to holders of November 23 is announced. The proceeds (about £97,000) will be used to buy plant and buildings necessary "to enable the company to increase production to meet the greater demand for Rotavators." The interim dividend is 5 per cent. (3d. per 5s. share) for 1959 and the final is expected to be 5 per cent. on the increased capital.

H. W. Lindop & Sons, Limited, malleable iron-founders, of Walsall (Staffs)—There should be a marked improvement in the results for the year to next June if current conditions are maintained, said Col. C. A. B. Lindop, chairman and joint managing director, at the annual meeting. The current year had started well with all the company's factories working to capacity following the sudden recession in the industry in late 1958 and early 1959.

Directors of **Tube Investments, Limited**, state that the strong recovery experienced in all sections of the group's activities towards the end of the year to July 31, 1959, has been maintained and has since gained momentum. The decline in overall demand in the first quarter of the past year, referred to in last year's report, persisted into the spring of 1959 and was particularly severe in the steel tube division and involved a reduction in requirements from the iron and steel division. Group trading profits, after depreciation of £4,165,643 (£3,525,560), were £12,579,244. They include, however, the profits of the British Aluminium Company, Limited, for the seven months since acquisition and those of Reynolds-T.I. Aluminium, Limited, for a similar period following the purchase by Tube Investments of a controlling interest in this company. The directors point out that, in so far as they are comparable with last year, they indicate a reduction in earnings of approximately 10 per cent.

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. C. Faulkner, F.R.S.A., HON.M.I.B.F.

istant Editor: Parkes, M.I.B.F.
Commercial Editor: P. E. Carden.

Advertising Manager:
F. Barrington Hooper, B.A.
Production Manager:
R. J. Lovell

Publisher: I. J. Dwyer
Circulation Manager: E. T. Griffiths

District Representatives:
. P. Elliott
orthern Area)
'phone:
trincham 1334

T. H. Smith
(Scotland)
'phone:
Dumbarton 1046

D. C. Ryall
(Southern Area)
'phone: TRAfalgar 6171

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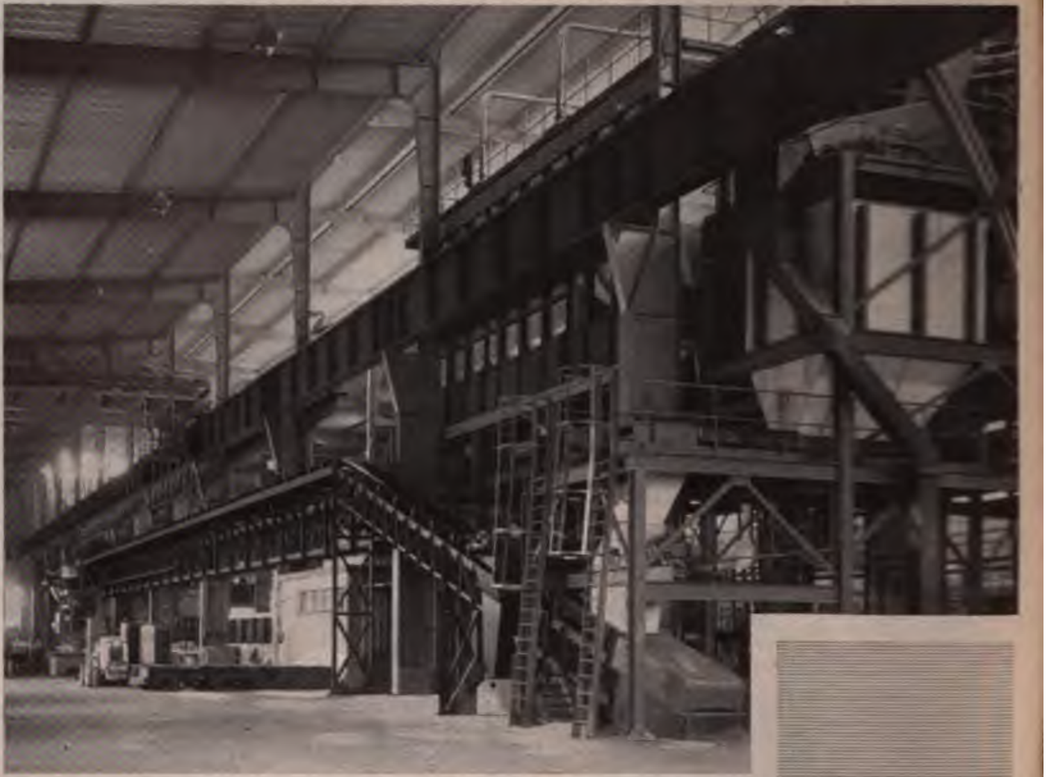

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The Scandinavian Market

The Federation of British Industries has just published an interesting Report* of three conferences held to discuss the potentialities of the Scandinavian and Finnish markets. In it is expressed the concensus of opinion that there is insufficient realization as to the value of these markets—something like £284 millions last year. The buying capacity of the area is high and in Sweden, actually higher *per capita* than in the United Kingdom. Actually, the four Nordic countries bought over £14 *per capita* of British goods in 1958. It is pointed out that the Germans regard Scandinavia as their natural market, just in the same way as the UK regards New Zealand and Australia. Since the war, they have made great efforts to increase their sales in the Nordic area.

So far as foundry equipment is concerned, Swiss competition in the area is probably more marked than German. Much of the plant offered is based on American designs, but manufactured in Switzerland. These same types of plant are made in the UK—for sale in the home market and most of the Dominions, but *not* in Europe, because of agreements with the American principals. Good foundry equipment is also being made in Sweden, so that it is not merely Swiss and German competition that British suppliers meet. Under all these circumstances, British manufacturers have done reasonably well, especially considering that in pre-war days their participation in the market was virtually zero.

In recent times, there have been some direct sales of malleable castings to the Swedish automobile industry, consequent on the closing down of a local source of supply. By and large, however, these countries are so well serviced by their national foundry concerns that they have no obvious large market open to overseas castings suppliers. In fact, the foundry industries of Sweden and Denmark are successfully selling vitreous-enamelled hardware in the United Kingdom. With regard to castings incorporated in machinery, it is for UK engineers and machine-tool makers—*i.e.*, founders' customers—to study the potentials of the important markets in Scandinavia. Electrically-operated plant and appliances suggest themselves as being especially appropriate for study, as electric current is the major fuel now used, having almost entirely replaced the traditional woodpile. The markets are by no means homogeneous and each one needs a separate approach.

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* UK Trade with Scandinavia and Finland. Published by the Federation of British Industries, 21, Tothill Street, London, S.W.1; price 4s. (presumably, plus postage).

German Symposium on S.-g. Iron

The *Verein Deutscher Giessereifachleute* (German Foundrymen's Technical Association) and the *Verein Deutscher Ingenieure* (German Engineers' Association) are jointly arranging a symposium on spheroidal-graphite cast iron on January 14 and 15, 1960, at Stuttgart-Bad Cannstatt, which will be combined with an exhibition of castings. The chair at the two-day meeting will be taken on alternate days by a member of the VDG and a member of the VDI respectively. The lectures, to be followed by discussions, will be held in the Great Kurhaus Hall. The programme will include:

Thursday, January 14, *at* 2 *p.m.* (In the chair Dr. K. Bandow, Stuttgart.) Papers will be presented by Dr. H. Wiegand (Darmstadt) on "S.-g. Iron as Design Material"; Dr. E. Mortara (Milan) on "Applications of S.-g. Iron"; Mr. M. Grandpierre (Brebach, Saar) on "S.-g. Iron Pipes for Gas and Oil," and Mr. H. Dienelt (Hamburg) on "Corrosion Behaviour of S.-g. Iron at Elevated Temperatures and Applications in Coking Plants."

Friday, January 15, *at* 8.30 *a.m.* (In the chair, a member of the VDI.) The following papers will be presented: "Austenitic S.-g. Iron—a New Material of Varied Properties," by Dr. A. B. Everest (London) and Dr. O. Nickel (Düsseldorf); "Fatigue Strength of S.-g. Iron," by Dr. J. Motz (Cologne); "Magnetic Properties of S.-g. Iron," by Dr. H. Dietrich (Krefeld); "User's Quality Requirements for S.-g. Iron," by Dr. H. Timmerbeil (Grevenbroich, North Rhine), and "Draft Specification DIN 1693 for S.-g. Iron—a Guidebook for its Application by the Designer," by Dr. H. Mühlberger (Frankfurt).

Dinner

BRITISH STEEL FOUNDERS' ASSOCIATION

The biennial dinner of the British Steel Founders' Association was held at Claridges Hotel, London, W.1, on December 2, Dr. C. J. Dadswell, the chairman of the Association, presiding. The loyal toast having been honoured, the "Steel Foundry Industry" was proposed by Sir Leslie Rowan, K.C.B., C.V.O., to which the chairman replied. Mr. C. H. Kain proposed the toast of "Our Guests," the reply being made by Mr. R. P. Morrison, Q.C. At the high table, in addition to the above, were the Rt. Hon. the Viscount Knollys, G.C.M.G.; Sir William Scott, O.B.E.; Mr. G. M. Menzies; Mr. L. Chapman, C.B.E.; Mr. T. W. McCullough, O.B.E.; Dr. R. Hunter; the Rt. Hon. Lord Clydesmuir; Mr. N. P. Newman, J.P.; Mr. A. C. Jennings, M.A. (Master of the Worshipful Company of Founders); Major R. Miles and Mr. F. A. Martin, O.B.E.

IT IS UNDERSTOOD that the Metal Box Company, Limited is to build a large factory at Bulawayo. The cost is likely to be in the region of £200,000.

USUAL SEASONAL INCREASE in unemployed took place between mid-October and mid-November, the national percentage rising from 1.9 to 2.0. At 431,000 the unemployment figure is the highest since the end of May, but well below the level of November, 1958.

LOWEST TENDER for the supply of steelwork in connection with the construction of a dam at South Saskatchewan, Canada, has been supplied by the Cleveland Bridge & Engineering Company, Limited, Darlington. The company's bid of $2,690,000 (about £1,000,000) was for the supply of steel ring beams for five diversion tunnels.

Forthcoming Events

DECEMBER [illegible]

Institute of British Foundrymen

Slough section: "Running and Gating of Castings," by W. W. Glick, 7.30 p.m., in the Lecture Theatre, High Duty Alloys, Limited.

DECEMBER [illegible]

Institution of Production Engineers

Swansea section: "Lighting and Colour as an Aid to Production," by R. Davies, 7 p.m., at the Central Library, Swansea.

Institute of Fuel

London section: Symposium on the "Uses of Liquid-petroleum Gases," at the Institution of Civil Engineers, Great George Street, S.W.1 (details from secretary).

Institute of Welding

North London branch: Works visit to British Oxygen Company, Limited, Angel Road, London, N.18.

Institute of British Foundrymen

London branch: "Aluminium Castings," by J. Vickers, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2 (joint meeting with the London local section of the Institute of Metals).

DECEMBER 17

Institution of Plant Engineers

Blackburn branch: "Procedure to avoid Disputes in the Engineering Industry," by J. B. Norton, 7.30 p.m., in the Castle Hotel, Blackburn.

DECEMBER 18

Institute of British Foundrymen

Coventry section: "Review of the First Five Years' use of the CO_2 Process in British Foundries," by A. Tipper, 7.30 p.m., at the Coventry Technical College, Room A5.

Northampton section: Annual dinner, 7 p.m., at The Plough Hotel.

DECEMBER 19

Institute of British Foundrymen

Scottish branch: Dinner/dance (in association with the local section of the Institute of Metals) at the Grosvenor Restaurant, Garden Street, Glasgow.

Latest Foundry Statistics

Light-alloy Castings: For the first time, it is the Ministry of Aviation which announces the monthly production of light-alloy castings. The announcement covers August, and now this service is under new management, it is to be hoped that it will be speeded up, as the figures are invariably the last of the major foundry production totals to be received. During August, 1,392 tons of aluminium castings were made from sand moulds; 3,874 tons were made as gravity-die- and 1,447 tons as pressure-die-castings. The output of magnesium castings was 139 tons. With the exception of magnesium castings, production in this month was somewhat higher than the monthly averages.

Ironfounding: The Council of Ironfoundry Associations reporting on employment in iron foundries for the week ending October 3, states that the total number employed was 124,950, and of these 116,406 were males and 8,544 females. Although this shows an increase of 941 over the census taken on August 29, it is still 3,208 fewer than approximately a year ago.

THE 12 ADMINISTRATIVE UNITS of the High Authority of the ECSC, hitherto directly responsible to the executive body, have been replaced by the following seven departments:—General secretariat; administration and finance; economic and energy; market (coal); market (steel); labour problems, reorganization and development; and loan and investment. A number of highly-qualified experts in ECSC service will be called upon to act as "special counsellors."

Centrifugally-cast Steel Pipe and other Tubular Products*

Operations at Sandusky Foundry & Machine Company, in the USA

The manufacturing aspects of centrifugal-casting production are reviewed, and it is made evident that, by knowledge and control of numerous factors or variables, successful production can be readily obtained. It is demonstrated that pipe and other tubular products can be produced of good quality, comparable in soundness, mechanical properties, and fabricability to wrought metals of similar composition and heat-treatment. This reproducible high quality is mainly the result of a very high pressure of molten metal, induced by the action of centrifugal force, pressing against the solidifying metal to eliminate solidification shrinkage voids, as solidification advances inwards across the wall section of the casting. Since this account deals not only with the plant at Sandusky, but also with basic formulae and processes applicable to centrifugal casting generally, it provides a useful up-to-date guide for those new to the subject, and also gives a pointer to the great amount of progress which has recently been made in this field.

The Sandusky Foundry and Machine Company, Sandusky, Ohio, engages exclusively in production of centrifugally-cast cylinders and tubes. The individual-cast cylinders range in size from 50 to 64,000 lb. each in steel, and a maximum of 83,000 lb. each in the copper-base alloys. They are cast and machined from 7- to 54-in. o.d., and up to 33 ft. long, in a variety of alloys including heat- and corrosion-resistant stainless-steels, carbon steel, low-alloy steels, copper-base and nickel-base alloys.

Sandusky Foundry Equipment

High-frequency melting equipment is the mainstay of the foundry. By interchanging relatively inexpensive furnace-boxes in the melting stations, the production of a heat of any size in either ferrous alloys or copper-base alloys, from a few lb. up to the total maximum capacity of the induction furnace installation (44,000 lb.) is easily accomplished. Other melting equipment, supplying additional melting capacity when required, consists of three 13,000-lb. gas-fired rotary melting-furnaces for copper-base alloys, and an 11-ton direct-arc furnace for additional steel production. The induction-melting shop has covered pouring pits in front of the furnaces, with power control and switching panels set in the wall behind the furnaces. The moulds are kept vertical for ramming-in a one-inch thick lining of plastic refractory mix (see Fig. 1). After a furnace is tapped into a ladle, the metal is poured into a basin which is attached to a spout which directs the metal into the spinning mould. Fig. 2 shows the mould in position on the casting machine, containing a casting ready to be removed. In Fig. 3 the casting is being removed from the mould after vibration has loosened the refractory lining in the mould. After being cleaned and heat-treated, the castings are machined in a modern machine-shop.

In the first part of the following account, the problems and factors to be considered and controlled in producing centrifugal castings are considered. The second part deals with such items as the physical and mechanical properties, quality control and inspection tests, and also fabricability of centrifugally-cast low-alloy and stainless steels. Numerous comparisons are made between the properties of wrought metals and those of centrifugally-cast metals.

CENTRIFUGAL-CASTING PROCESS

Hollow cylindrical metal shapes such as pipe and vessels used in high-temperature and pressure applications are amenable to economical production by the true centrifugal-casting process.

General Features

The true centrifugal-casting process consists essentially of pouring molten metal into a horizontally-revolving cylindrical mould, by the action of which it is accelerated. The metal is held, by the centrifugal force developed, against the surface of the mould cavity, while solidifying. This method of centrifugally-casting hollow cylinders tends to eliminate solidification shrinkage microvoids during the period of metal solidification, rather than during hot-working operations, as is the case with similar hollow items forged to shape from statically-cast ingots.

Casting Machine

The centrifugal-casting machine (see Fig. 4) is in principle a simple arrangement, comprising:

(*a*) A cylindrical mould or case with driving-bands fastened to its outer surface near both ends;

(*b*) a set of two drive-rollers spaced the same distance apart as the bands on the mould—thus, the bands on the mould rest on the drive-rollers.

(*c*) A variable-speed motor-drive connected to the

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* Prepared by James T. Gow for presentation at the annual power forum of the Philadelphia Section of the American Society of Mechanical Engineers. (Abridged)

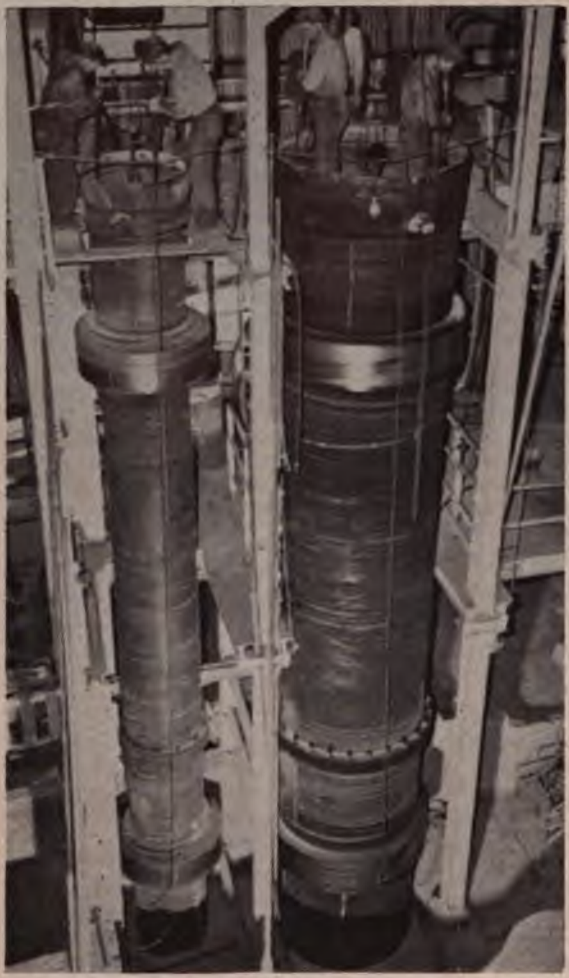


FIG. 1.—*Plastic refractory mix being rammed into two large moulds, arranged vertically, at the works of Sandusky Foundry and Machine Company, in Ohio, USA.*

drive shaft attached between a front and back drive-roller, and

(*d*) a pair of thrust-rollers which contact the front band on the mould.

Mould

The metal mould (see Fig. 5) into which the molten metal is poured is generally lined with either:

(*a*) a relatively thin layer of plastic-refractory moulding mix, which has been rammed in place, coated with a refractory wash, and then baked dry and hard, or

(*b*) a lighter covering of sprayed-on refractory material.

The type of lining used in a mould is largely dictated by economic considerations; however, grain-size differences attendant on different solidification rates are at times of importance.

Size Control

In making centrifugally-cast pipe, the mould is rotated with its axis in a horizontal position. A predetermined quantity of metal is then poured into it from a transfer ladle through a ceramic-lined pouring basin and spout, which is positioned at one end of the mould. The inside diameter, and the mould cavity, determine the outside diameter of the casting. Shrinkage, which is approximately 0.25 in. per ft. for steels, must also be taken into consideration when deciding the mould size. The wall thickness for a given diameter and length of casting is controlled by the quantity of metal poured into the mould. Therefore, each casting is poured with a predetermined weight of metal.

Speed of Rotation

In general, the mould is rotated at such a speed as to create a centrifugal force of the order of 75 times gravity at the centre of the wall thickness of the casting, but not less than 55 times gravity at the inner surface of the casting. Such conditions of spinning speed have generally been found to be optimum for rapid pickup and distribution of the molten metal, and for holding the molten metal in place during solidification under a sufficient pressure head to assure a well-fed metal section.

Solidification

Solidification of the casting begins at its outer surface, as a result of heat withdrawal by the contacting mould material. Solidification then gradually progresses inwards through the wall of the casting to the inner surface of the casting. Thus, during solidification of a centrifugal casting, there is a liquid head of metal under centrifugal pressure being applied to the solidifying metal, thereby feeding the solidification-shrinkage areas. This produces a casting with a high degree of soundness. However, some unsoundness, caused by solidification shrinkage, remains concentrated near the inner circumference of the rough casting where the last of the metal solidifies. In order to make a casting suitable for applications requiring a clean, sound inner surface, this layer of feeder metal must be removed by boring.

Potential Defects

A brief insight is now given into the main factors to be considered and controlled in avoiding or minimizing such defects as: (*a*) Composition

TABLE 1.—*Variables influencing the Production of Good Castings.*

Metal Composition and Physical Properties
  Fluidity and density of metal.
  Chemical composition differences between start and completion of solidification.
  Temperature and the extent of the temperature difference between the start and completion of solidification, *i.e.*, the solidification range.
Casting Size
  Diameter, wall thickness and length.
  Relation of mass of metal to cooling surface.
Mould Material
  Heat capacity and conductivity of mould.
  Mechanical properties of mould, expecially at high temperatures.
  Properties of mould coating.
Casting Process
  Spinning speed of mould.
  Pouring temperature of metal.
  Pouring rate.
  Mould temperature.
  Cooling conditions.

gradient across the wall section; (*b*) cracking or hot-tearing, either transverse or longitudinal; (*c*) circumferential lapping, and (*d*) segregation banding. A knowledge of the interrelated variables shown in Table 1 is essential.

Influence of Spinning Speed

Since these variables operate concurrently, it follows that a set of conditions found to be optimum for a particular casting, will not be suitable for different-sized castings of the same metal, or for castings in other alloys. Furthermore, even given other uniform conditions, the spinning speed of the mould has a considerable influence on the casting (see Table 2).

TABLE 2.—*Factors influenced by the Spinning Speed of the Mould*

(*a*) Mode and rate of metal pickup and flow along the length of the mould.
(*b*) Extent of the chilling action of the mould upon the layer of metal immediately in contact with the mould surface.
(*c*) Tendency towards structural uniformity, and the structural character of the solid metal.
(*d*) Pressure on the mould surface.
(*e*) Pressure gradient across the casting wall.
(*f*) Circumferential tension in the casting wall.

Variation of the other four casting-process variables mentioned in Table 1 will also alter factors (*a*) to (*c*) in Table 2.

The optimum speed of rotation is that which provides rapid pickup of the metal poured into the mould with minimum vibration in the casting machine. Such conditions tend to give a uniform structure free from pronounced segregation.

Metal Pickup

When molten metal is poured on to the surface of a rotating mould, the whole of it is not picked up immediately. Rotational velocity is imparted to it by virtue of the friction between the liquid metal and the mould. After the mould is covered, all succeeding metal will be accelerated by reason of internal friction between the liquid surface already spinning and the metal to be picked up. This creates an appreciable tendency to slippage. An increase in mould speed above that which allows of slipping and cascading, but below the critical vibration range, tends to reduce the metal grain-size. Also, the inner-surface quality improves as spinning speed increases.

Too low a rotational speed results in delayed pickup of metal on the mould wall, causing slipping, raining, or cascading of the metal inside the mould. This is conducive to segregation of different-density constituents in bands or zones; also, the cylindrical bore becomes rougher. This may also cause laps and entrapped oxides, if the slipping or cascading continues until the metal is nearly solidified.

Too high a rotational speed generally results in mould vibration, which causes a circumferential-line type of segregation banding. Excessive spinning speed can produce circumferential tension high enough to cause radial cracks or circumferential hot tears as the solidifying metal shrinks away from the mould wall.

With the optimum spinning speed, the metal will be picked up rapidly and held firmly to the mould wall without slipping or cascading. With the liquid metal in place, a pressure gradient is established radially across the wall thickness of the casting, as a result of the centrifugal action, which is very effective in cleansing the metal of non-metallic inclusions. This pressure is lowest at the inner surface, increasing to a maximum at the outside of the pipe. Since particles of different densities are subject to different pressures at a given rotational velocity, there is a tendency to an outward movement of the higher-density material, displacing the lower-density material

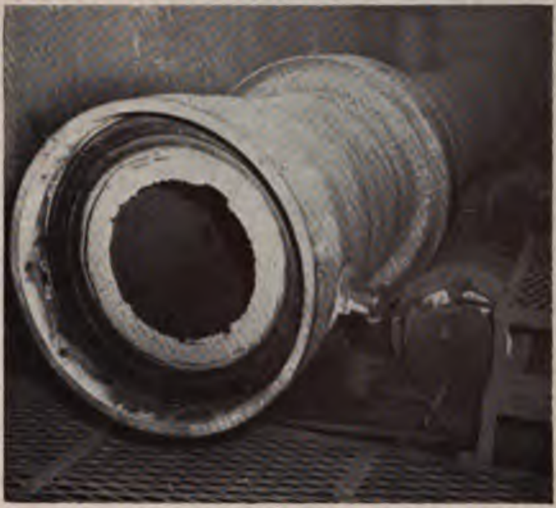
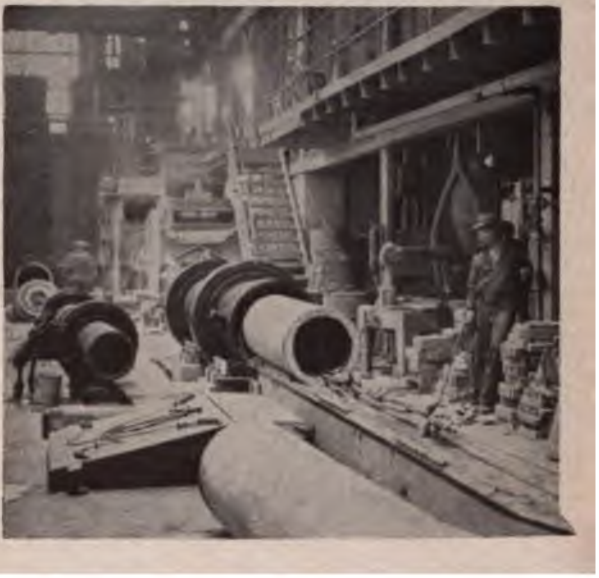


FIG. 2.—*Pipe mould, containing a solidified casting, in position on the casting machine; one of the driving rollers can be seen in the right foreground.*

FIG. 3.—*The cooled pipe-casting emerging from the machine, after the mould has been vibrated to loosen the refractory lining.*



toward the inner pipe surface. In this manner, small slag particles and other light non-metallic inclusions are separated out toward the i.-d. surface, to be removed by a subsequent machining operation.

Pouring Temperature and Rate

The temperature of the metal entering the mould, and the rate of pouring, modify the influence of mould speed on the structure and segregation. The spinning speed has to be increased as the pouring temperature is increased, in order to minimize slipping and cascading during the period of pickup of the metal poured into the mould. This is due to the increase in metal fluidity at the higher pouring temperatures. Slower pouring, however, may compensate to some extent for an increased pouring temperature, since it enables acceleration to be brought about more effectively. In other words, the minimum spinning speed for satisfactory castings will be lower when using a slow pouring rate or a low casting temperature than when using faster pouring or hotter metal.

Too low a casting temperature, along with slow pouring, gives rise to cold lapping and possible gas entrapment. It is important that the pouring rate be sufficient to keep the metal advancing over the mould surface continuously until the end of the mould is reached. If it stops even momentarily, cold shuts result.

Longitudinal Cracks

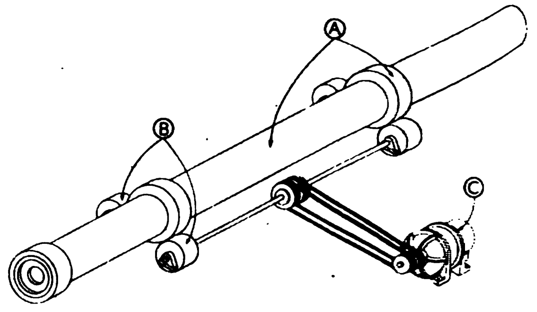
High pouring temperatures, rapid pouring, and high mould speeds are believed to be the main causes of the formation of longitudinal cracks. These defects are initiated in the early stages of solidification. One step seems to be the rupturing of the thin outer shell, undoubtedly by the circumferential tensile stress becoming sufficiently great, after the shell has contracted away from the mould, to cause rupturing of the shell. The stress in the shell is increased by increased spinning speed, and also by pouring the liquid metal into the mould rapidly, either of which act to increase the total effective centrifugal pressure. A high pouring rate or high casting temperature also decrease the rate of solidification, so that a thinner shell is formed within any given time and hence is more prone to rupture.

Heat Extraction from the Outer Surface

Since it is all-important to have early heat withdrawal, mainly outward from the o.-d. surface of the casting, so that solidification will progess inward across the casting wall, attention must be given to the mould which will take up and dissipate this heat. When the metal is first poured into the mould, heat immediately starts flowing from the hot metal surface into the wall of the cold mould. This heat exchange causes the temperature of the metal to drop and the temperature of the mould to increase. The temperature gradient across the mould wall is initially very steep. The rate and amount of heat transferred from the metal to the mould material, and the temperature gradient established across the mould wall, are determined by the thermal conductivity and specific heat of the mould material.

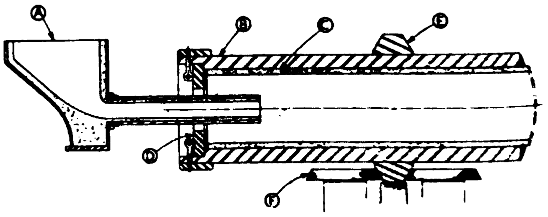
Mould Cooling

At such time as the first heat units reach the outer mould surface, which is in contact with air at room temperature, heat transmission away from the mould commences. How hot this outer surface becomes depends on the relative rate at which heat is delivered to this surface, as contrasted to the rate it is transmitted away from the surface. The cooler this outer surface of the mould is maintained, the more steep will be the temperature gradient from its inner to outer surface, and the more rapid will be the rate of heat withdrawal from the casting. A water spray or bath is often used to cool the outer mould surface. The period of heat removal that is most important is, of course, that in which the first 100 to 150-deg. C. temperature drop occurs in the casting. This is the period during which the liquid metal solidifies.



Key: A—metal core case with driving bands; B—drive rollers, and C—motor drive.

FIG. 4.—*Diagram showing the essential parts of a centrifugal-casting machine.*



Key: A—refractory-lined pouring basin; B—core case; C—refractory lining; D—face-plate closure; E—core-case driving band, and F—thrust rollers.

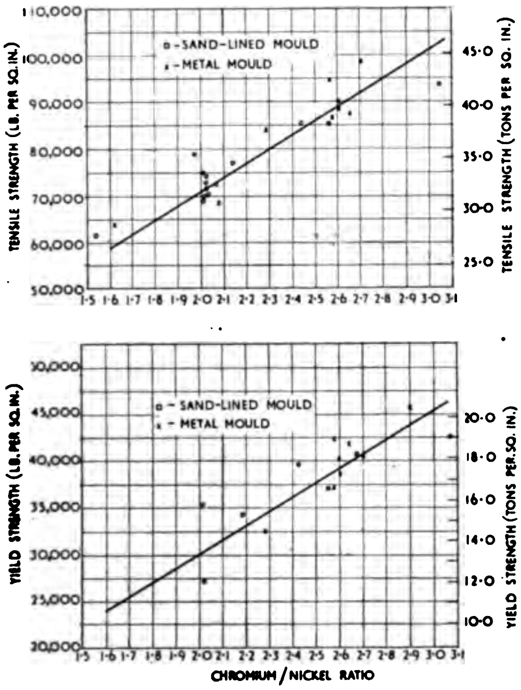
FIG. 5.—*Sectional drawing of the pouring basin, metal mould and casting machine.*

Radial Pressure during Solidification

To illustrate the magnitude of the radial pressures developed and operative to provide a sound casting, the production of a 24-in. o.-d. casting will be considered. The radially-acting pressures at various depths beneath the i.-d. surface of a 24-in. o.-d. casting, poured with an amount of metal to give a three-inch wall thickness, are shown in Table 3. Both the radial pressures in lb. per sq. in., and the equivalent static head heights corresponding to these radial pressure values, are given. The pressure values shown are those developed at a rotational speed such as to provide a centrifugal force of 75 times gravity at the mean diameter of casting.

Table 3.—*Pressure Distribution across the Wall Section of a 24-in. o.d., 18-in. i.d. Casting made of Stainless-steel.*

Casting diameters.		Radial pressure (lb. per sq. in.).	Equivalent static-metal head height (ft.).
I.D. (in.).	O.D. (in.)		
18	24	62.7	18.8
18	22	39.8	11.8
18	21	29.1	8.7
18	20	18.9	5.6
18	19	9.2	2.7
18	18	0	0



In Figs. 6 and 7 the equation:

$$\frac{Cr-16C+2\,Si}{Ni+0.5\,Mn}$$

, gives the ratio of austenite-forming elements *versus* ferrite-forming elements.

Fig. 6.—(*top*) *Graph showing how the room-temperature tensile strength of centrifugally-cast CF-3 stainless-steel alloy is influenced by variations in chemical composition, and* (*below*) *similar graph for yield-strength.*

The magnitude of the radial pressure of molten metal pressing against the solidification front, which is advancing across the casting wall section from the o.-d. to the i.-d. surface, is readily visualized when expressed in terms of the equivalent static head heights shown in the right hand column of Table 3. From this, it is evident that the process of solidification and feeding of the solidification shrinkage occurs under conditions far more ideal than ever attained in static floor castings, or when forging ingots.

Machining Stock Allowances

A depth of metal from both the o.-d. and i.-d. surfaces of the tubular centrifugal castings must be removed by machine turning and boring operations, to provide a clean, sound finished product. In the case of a stainless-steel casting intended to finish with a ¾-in. wall, the amount to be machined away may be as much as 56 per cent. of the as-cast wall thickness. The amount of metal to be removed expressed as a percentage of the total cast wall-thickness decreases progressively as the wall-thickness required for the finished machined casting increases, so that, when providing a finished four-inch wall-thickness casting, only some 32 per cent. of the as-cast wall will need to be removed by machining. Table 4 shows the casting dimensions which would be required to provide sound machined castings (of 24 in. o.d.) with finished machined wall thickness varying from ¾ to four in.

Table 4.—*Depths of Stainless-steel to be removed by Machining to provide a Clean, Sound Tubular Product.**

Finished dimensions (in.).			As-cast dimensions† (in.).			Depth of metal to be removed by machining (in.).	
O.D.	I.D.	Wall thickness.	O.D.	I.D.	Wall thickness.	O.D.	I.D.
24	$22\frac{1}{2}$	$\frac{3}{4}$	$24\frac{7}{16}$	21	$1\frac{23}{32}$	$\frac{7}{32}$	$\frac{3}{4}$
24	21	$1\frac{1}{2}$	$24\frac{7}{16}$	$18\frac{15}{16}$	$2\frac{3}{4}$	$\frac{7}{32}$	$1\frac{1}{32}$
24	18	3	$24\frac{7}{16}$	$15\frac{1}{8}$	$4\frac{21}{32}$	$\frac{7}{32}$	$1\frac{7}{16}$
24	16	4	$24\frac{7}{16}$	$12\frac{7}{8}$	$5\frac{25}{32}$	$\frac{7}{32}$	$1\frac{9}{16}$

* The rotational speed for each casting gave a centrifugal force of 75 times gravity at the mean diameter.

† For castings produced on a 1-in. thick refractory lining in a metal mould.

The stock to be removed, by machining, from the o.d. of the casting is mainly that which has been found necessary to take care of any bow that may occur along the length of the casting while handling, especially during subsequent heat-treatment. The stock to be removed by machining from the i.-d. of the casting is largely that metal which has served as the "feeder" metal (last to solidify), and as a result contains micro- and macro-porosity.

Greater Pressure

It is of interest to note from Table 5 that the equivalent static head height of the radial pressures present during the casting of the aforementioned 24-in. o.-d. tubes, at the depths beneath the i.-d. surface which will be removed by machining, are far greater than normally used in making a static casting. Thus, it is evident that the section of wall-thickness of the centrifugal casting remaining after machining away the o.-d. and i.-d. stock metal is cast and solidified under considerable radial pressure generated by the centrifugal force. For this reason, the centrifugal process ensures in a vast majority of cases the production of dense, non-porous tubular shapes.

TABLE 5.—*Radial Pressure in 24-in. o.d. Stainless-steel Castings at Location of Maximum Depth of I.-d. Stock to be removed by Machining.*

Finished wall-thickness (in.).	As-cast wall-thickness (in.).	I.-d. stock (in.).	Radial pressure at I.-d. stock depth.	
			Lb. per sq. in.	Equivalent static head (ft.).
3/4	1 23/32	3/4	15.7	4.7
1 1/2	2 3/4	1 1/32	20.0	6.0
3	4 21/32	1 7/16	25.6	7.6
4	5 29/32	1 11/16	27.2	8.1

PROPERTIES, AND INSPECTION TESTING

Tubular centrifugal castings conform readily to the mechanical and physical test requirements of the various ASTM casting specifications, for which the test sections are specified to be taken from well-fed test-blocks. Also, the heat-treated centrifugally-cast steels of most compositions are as strong as comparable sections of the same steel, rolled or forged and similarly heat-treated.

Tensile Strength

Table 6 shows average tensile-test results for sections taken directly from some 100 consecutive tubular centrifugal-castings, in each of three alloys differing widely in composition and heat-treatment. It is evident that tensile properties are being provided which continually exceed the ASTM Specification requirements. This is attained through chemical composition control in the melting furnaces from heat to heat giving reproduceably sound metal in the fully-machined wall section of the castings.

Unique Features

One important feature of the tubular centrifugally-cast metal is the uniformity of tensile properties in the longitudinal and transverse direction. This is not the case for the wrought-steel products. Another feature which is highly important is that the tubular centrifugal-castings can be produced in alloys which are not amenable to forging or rolling. An important case in point is with stainless-steels, wherein the composition balance can be so altered for the casting within specification limits that tensile strengths ranging from 26·79 to 44·64 tons per sq. in., and yield strengths (0·2 per cent. offset) ranging from 11·16 to over 20·09 tons per sq. in. can be obtained for the solution-quenched alloy. Accompanying this change in properties is a change in the percentage of the microconstituents ferrite and austenite in the metal structure. In the case of the wrought

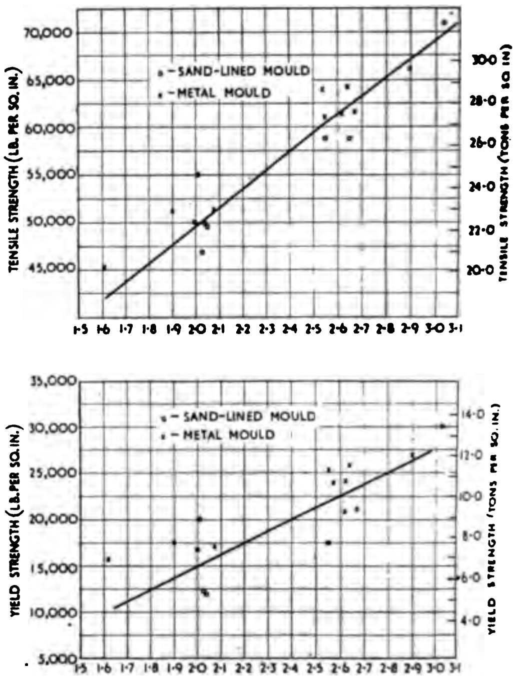


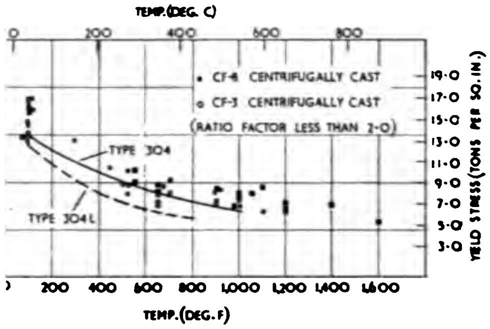
FIG. 7.—*Similar graphs to those in Fig. 6, showing how the tensile and yield-strengths of CF-3 alloy vary with chemical composition, at a temperature of 343 deg. C.*

TABLE 6.—*Melt Quality, as measured by Tensile-test Results from* 100 *consecutive Tubular Centrifugal-castings.*

ASTM Specification No.	Requirement and range.	Tensile strength (tons per sq. in.).	Yield strength (tons per sq. in.).	Elongation (per cent).	Reduction of area (per cent).	Brinell Hardness No.
	Alloy type—13 per cent. Cr/Fe					
A296 Grade CA-15	Specification requirement, minimum	40.18	29.02	18	30	—
	Range obtained in production*	41.96 to 47.32	31.70 to 36.16	21 to 25	45 to 55	197 to 214
	19 per cent. Cr, 9 per cent. Ni, 0.03 per cent. maximum stainless					
A296 Grade CF-3	Specification requirement, minimum	29.02	12.50	35	—	—
	Range obtained in production†	30.36 to 33.48	13.39 to 15.62	48 to 71	58 to 79	121 to 143
	Mild Steel					
A27 Grade 60 — 30	Specification requirement, minimum	26.79	13.39	24	35	—
	Range obtained in production‡	29.91 to 32.14	14.73 to 18.30	28 to 34	37 to 48	131 to 149

* Heated at 982 deg. C., air-quenched to room temperature, then tempered at 732 deg. C. and air-cooled.
† No heat-treatment.
‡ Annealed at 899 deg. C., furnace-cooled to 482 deg. C., air-cooled to room temperature.

however, a duplex structure such as this es with the forging or rolling of the metal. shows graphs of tensile and yield-strength for tests made at room temperature, as to ratio factor values. The ratio-factor are simply the ratio of austenite-forming s *vs.* ferrite-forming elements, arrived at formula shown in the caption. Castings are ited made both in sand-lined and refractory-metal moulds. There is no difference in the ies produced by the two moulds. Similar of tensile-test data are shown for tests at ;. C. in Fig. 7. The CF-3 alloy is shown v, through change in composition balance, ns in tensile strength from 20·09 to 33·48 r sq. in., and in yield strength from about 12·5 tons per sq. in.



—Comparison of the yield-strengths (0.2-*per* *ƒ-set**) *of CF-3 and CF-8 centrifugally-cast* *s-steels, with curves showing the minimum* *rengths required from wrought stainless-* *the* 304 *L and* 304 *grades.*

mparison of Strength at Temperature

ımparison, made over a wide range of tem-es, of the yield strengths at 0·2-per cent. of centrifugally-cast and wrought-type 304)4L stainless-steels is of interest, in that ɾs that the centrifugally-cast metal can meet the same requirements as the wrought metal. Figure 8 presents a graph of elevated-temperature yield-strength values for cast-type "CF" stainless-steel (wrought equivalent-type 304). Onto this graph have been superimposed two curves, representing the minimum code acceptable yield-strengths of (*a*) type-304 wrought stainless-steel, and (*b*) type-304L wrought stainless-steel. These yield-strength values were derived from the maximum allowable design-stress, values given by the ASME Boiler and Pressure Vessel Code—Section VIII, Table UHA-23 and from Case 1122-6. To convert from the design-stress values set forth in the codes to yield-strength values, the former were divided by 0·625. The yield-strength values at 0·2-per cent. offset of the centrifugally-cast metal are shown by squares for the 0·08-per cent. carbon (max.) grade, and open circles for the 0·03-per cent. carbon (max.) grade. The values plotted are for heats with chemical compositions such that their ratio factors were less than 2·0. It is readily apparent from Fig. 8 that the centrifugally-cast metal displays yield-strength values in the same range as, and at least equal to, wrought metal for both the extra-low carbon and regular grades of stainless-steel in the annealed condition. It is therefore evident that ASME Boiler and Pressure Vessel Code design-stress values, Section VIII, Table UHA-23 and Case 1122-6, should apply to centrifugally-cast pipe meeting all other inspection test requirements.

* * *

In the complete paper, the above section on properties and inspection testing concludes with comments on the weldability of centrifugal castings made from CF-3 alloy (wrought equivalent 304L). The next main section of the paper consists of an evaluation of centrifugally-cast pipe for high-pressure, high-temperature service in nuclear-power plants, in which a description is given of the incorporation of a CF-3-alloy pipe into a test loop at the works of Westinghouse Electric Company. The author concludes by describing tests carried out at the Battelle Memorial Institute on the mechanical properties of a centrifugally-cast heavy-walled pipe, made by Sandusky Foundry Company from a 2¼-per cent. chromium/1-per cent. molybdenum steel. The results of tensile, creep, creep-rupture, hot- and cold-bend, extrusion and swaging tests are given.

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* mably the stress value at which 0.2-per cent. elonga- gistered—Editor.

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ssey-Ferguson's UK Organization

r the title of "United Kingdom Operations" e management group has been established, eadquarters at Coventry, to control and co- ꞓ all Massey-Ferguson operating activities in Mr. A. A. Thornbrough, president of the vide company, assumes, for the time being, ve direction of United Kingdom Operations as ng director.

ey-Ferguson (Great Britain), Limited, will its name to Massey-Ferguson (United Kingdom), l, and Mr. Eric Young will be deputy managing . He is deputy chairman and managing director sey-Ferguson Holdings, Limited, which will con- o meet statutory and financing requirements g all British subsidiaries. The creation of separ- erations units in Australia, France, Germany, America, and the UK accords with the new structure of the parent company with Britain cornerstone of world expansion.

K. & L's New Branch Factory

Increasing demand from both home and export markets for Jones mobile cranes, has led to the acquisition by K. & L. Steelfounders and Engineers, Limited, of Letchworth, Herts, of one of the Board of Trade factories at Newburn-on-Tyne, some five miles from Newcastle-on-Tyne. The factory, which has been acquired for expansion of the company's engineering division, is situated on the Newburn Trading Estate which is administered by North East Trading Estates, Limited. It has a floor area of 24,000 sq. ft., and is complete with all power, lighting, heating and other services, and has a two-storey office block.

Due to the shortage of skilled engineering personnel in the Letchworth area, and in conformity with Government policy, this expansion has been planned to take the work to where men are available. It is expected that a start will be made in the next few weeks with a dozen or so machines, and a gradual build up will continue through 1960.

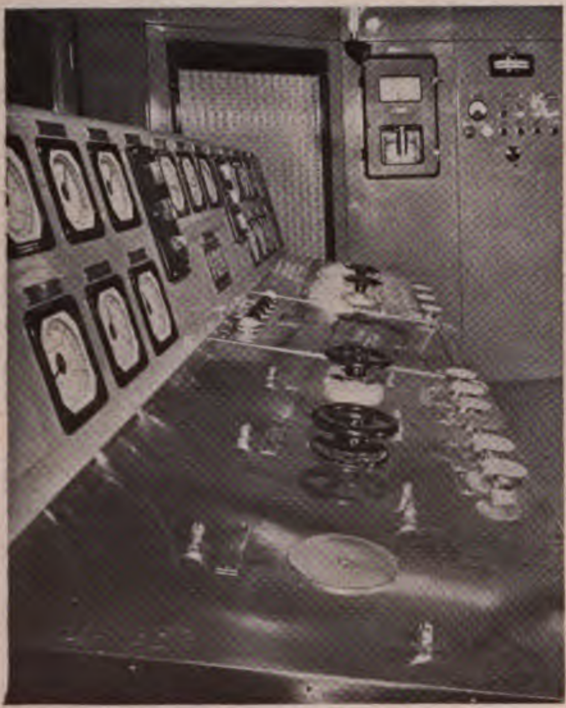
Stanton Ironworks' New Ore-preparation Plant*

A new ore-preparation plant, designed to process from 25,000 to 30,000 tons per week, was opened in October, at the Ilkeston works of the Stanton Ironworks Company, Limited. It has taken two and a half years to construct, at a cost of nearly £4,000,000. A site of 40 acres had to be prepared before the plant could be built, a stream having to be diverted. This new plant forms an essential part of what is now a fully integrated ironmaking works. The plant is of particular interest to founders because the output from the Stanton blast-furnaces consists almost wholly of pig-iron for foundry re-melting. Obviously, any steps to produce this iron more economically and with greater uniformity of composition in a versatile range will be welcomed by founders.

More than six miles of conveyor belting is in use at Stanton's new ore-preparation plant at Ilkeston, near Nottingham, and there are sidings for 700 wagons. Altogether, 180 men are employed, including electrical and mechanical maintenance staff. The whole plant is provided with an extensive range of instruments (see Fig. 1), the various sections being controlled from central points, and it has its own electrical and mechanical-maintenance shops, offices, stores and ablution centre. (Conveyors and gantries were by Moxey, Limited.)

The iron ore to be prepared is received by rail, and extensive sidings facilitate the assembly of the various ores constituting the blend. From these sidings, the wagons are fed by gravity to a wagon haul, which delivers them to a tippler rated at 30 wagons per hr. The ore passes from the tippler hopper, *via* rough screening feeders to the primary crusher (rated at 800 tons per hr.), which reduces it to 6 to 8 in. in size. The ore then joins the rough screened material and is conveyed (see Fig. 2) to the secondary crushers, where it is reduced to a maximum size of 3 in. (Main contractors for the crushing plant were Mitchell Engineering, Limited.) After crushing, the ore is conveyed to the bedding plant (supplied by Fraser & Chalmers, Limited), where it is spread horizontally in piles each containing 6,000 tons, and later reclaimed in vertical slices to ensure a uniform mixture of the various ores. The reclaimed ore then passes to the screen house, where the minus-½-in. material is screened out and conveyed to the sinter-plant stockyard. The plus-½-in. size is conveyed *via* the distribution bins to one of the two blast-furnace plants. (Head Wrightson, Limited, supplied two 2½-ton ore-transfer cars.)

FIG. 1.—*Part of the main sinter-plant control-room. The control staff are linked by telephonic communication with the plant operators.*



Sinter

The sinter material, consisting of various types of ore fines and coke fines, is assembled in blending bunkers and discharged in the correct proportions through table feeders on to a conveyor. The sinter mix is conditioned in a mixer and evenly spread on the continuously moving sinter strand (see Fig. 3). The mix is then ignited under a hood fired by blast-furnace gas, and combustion is continued as the strand moves along by means of air drawn through the bed of material by the extraction fan. Hot sinter is discharged from the end of the machine *via* a breaker and a hot screen for removing fines into a large-diameter rotary cooler. Cooled sinter is delivered by conveyor to the distribution bunkers for discharge to the blast-furnace bins. Dust-extraction equipment is installed on the sinter plant at every critical point. (Most of the sinter plant was supplied by Huntington Heberlein, Limited. The dust-extraction equipment consists of a How-den Centicell unit, which operates at a rate of 45,000 cub. ft. per min. at a pressure of 7.5 in. water gauge, at 200 deg. F.)

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* The official opening of the plant was described on page 274 in the October 8 issue of the JOURNAL.

Blast Furnaces

The ore-preparation plant serves two modern blast-furnace plants: the Old Works, which is a two-furnace plant, and the New Works, which is a three-furnace plant. These are entirely separate installations complete with ancillary plant, including pig-casting machines. In addition, however, to the common ore feed, they have a common coke supply from the battery of 85 Becker regenerative combination ovens with a weekly capacity of 8,500 tons of blast-furnace coke, and an extensive distribution system for clean blast-furnace gas. Each of the blast furnaces has a hearth dia. of between 17 and 18 ft., and the total ironmaking capacity of the two plants is between 600,000 and 700,000 tons per annum. The blast-furnace gas, after cleaning to very fine limits, is used for firing the hot-blast stoves and for generating steam which operates the turbo-blowers and turbo-generators. The remainder is used for under-firing the coke-oven battery, thus liberating 24,000,000 cub. ft. of coke-oven gas per day for distribution by the East Midlands Gas Board.

The five blast-furnaces make foundry pig-iron to a wide range of analyses, and it is for this reason that the ore-preparation plant has been made completely flexible, so that ores of varying composition can be used to achieve the desired results. All the pig-iron produced can be machine-cast, and approximately half of it is used in the company's own spun-pipe plants and foundries, leaving the remainder for sale to outside foundries.

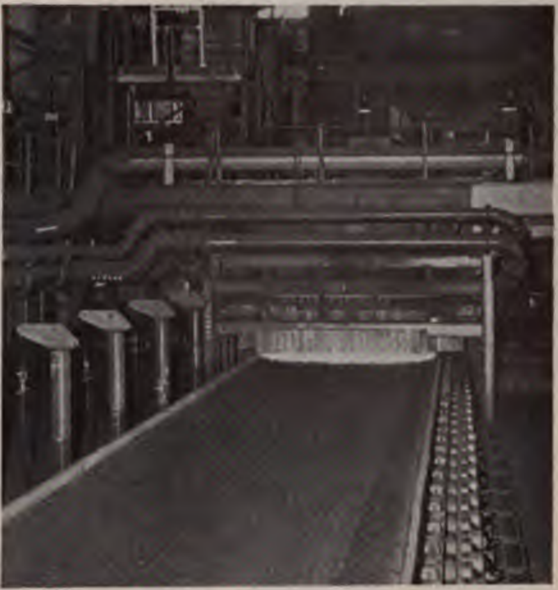
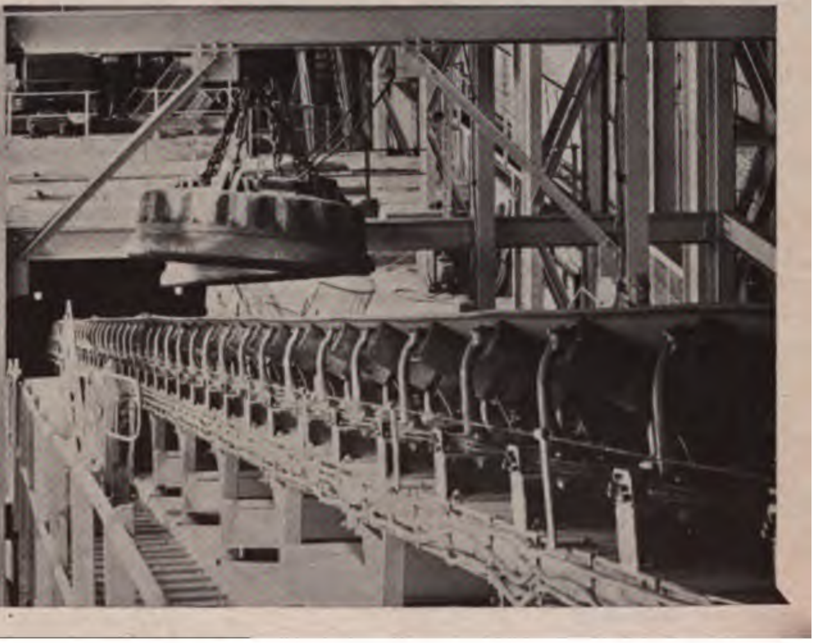


FIG. 3.—*The sinter strand at Stanton's new £4,000,000 plant, with the ignition hood and feed hopper in the background. A large number of special heat-resisting cast components are used in the construction.*

Ore-stocking: The success of the new sinter plant depends in large measure on full integration with the company's much enlarged ore-stocking facilities, mentioned earlier. The open stockyard can accommodate 16,000 tons of foreign-ore fines and 22,500 tons of home ore. Under-cover-stocks can take 4,000 tons each of foreign and home ore, with 3,000 tons of miscellaneous materials and 500 tons of coke.

FIG. 2.—*In the new Stanton crusher-house, it is interesting to note the use of a pair of standard lifting-magnets, carried on overhead runways, for taking tramp iron from the ore as it is conveyed to the secondary crushers. Shown below is a cast roller for the Hadfield primary crusher used.*



" Permindex "—an International Market Place

" Permindex," a permanent market place for the sale of industrial products made in many countries, is to open in Rome at the beginning of 1960. Permindex is a shortening of the words " permanent industrial exhibition." It will be housed in the four large marble buildings erected for Mussolini's 1942 Universal Exhibition—a project which the war effectively killed. The buildings are truly magnificent and have a total floor space of over 420,000 sq. ft.

The idea behind the project is to provide a centre where it will be possible to buy and sell, in one market place, the best of the world's industrial products. Mr. Ferenc Nagy, president of the sponsoring organization, epitomized the proposal when he told how the representative of a large Californian store complained that, coming to Europe to buy 156 different articles, he spent 10 weeks in travelling over 14 countries. This buyer would accomplish all that he wanted at the new world trade centre, said Mr. Nagy.

Categories Embraced

The exhibition will not be confined to store goods: it is to embrace exhibits of the heavy industries, including mining machinery and mechanical engineering products, machine tools, and foundry and railway equipment. The following are the main sections:—Industrial machinery and equipment; electrical goods; chemical products and raw materials; mechanical engineering and power; building; office equipment; pharmaceutical, medical and dental products; food and drink; toys; scientific equipment; furniture; clothing and accessories; jewellery; optical goods; transport; travel, and tourism and sport.

Exhibits will be placed in categories and not on a nationality basis; they will be permanently sited, and they will be brought continually up to date. Buyers of dynamos and diesel engines, for example, will find the products of firms throughout the world grouped together for easy and rapid comparison.

It is hoped to sponsor various international business conventions in the exhibition halls. Where exhibitors do not wish to employ permanent stand-personnel, staffing of the exhibits will be undertaken by Permindex, for an inclusive fee. The exhibition halls will be open to the public, and in this connection the promoters point out that 20,000,000 tourists visited Italy in 1958. Rome is to be host to the Olympic Games in 1960, when 300,000 spectators a day are expected in the various stadiums. (Permindex's representative in Great Britain is Industrial and Trade Fairs, Limited, Drury House, Russell Street, London, W.C.2).

British Aluminium's Steady Progress

Steady progress had been made on product developments and aluminium was finding its way into many new applications, reported the chairman of the British Aluminium Company, Limited, Sir Ivan Stedeford, at the annual meeting. Orders, particularly from the home market, had improved during the seven months to July 31, 1959, and he believed this trend would continue, but it held no firm promise of an early return to conditions of full recovery which the directors confidently awaited.

Sir Ivan said that the period in review was one of consolidation rather than expansion. More satisfactory results had been produced due to a combination of improvements in the operational efficiency of the fabricating side and a higher rate of working due to an upturn in demand.

Midland Heating & Ventilation's Golden Jubilee

This year the Midland Heating & Ventilation Company, Limited, of Bedford Road, Birmingham, 11, celebrates its Golden Jubilee. The company was formed towards the end of the nineteenth century to exploit new practices in central heating and associated engineering, and at that time occupied premises at Upper Trinity Street. The staff consisted of four draughtsmen, two employees for general administration and about 20 general operatives. Since one of the early shareholders was a prominent rubber company, it is not surprising that, in the first instance, its main interest was manufacturing plant for the rubber industry for export to Malaya.

In 1909 the company was incorporated, and then in 1916 it moved to larger premises in Bedford Road, and became a pioneer in the manufacture of dust-arresting and filtration plant. Mr. C. H. Harton who was manager in 1909 remained until his retirement as managing director in 1949, when the company became associated with the Carter Thermal Industries group, with Mr. John Carter as managing director.

To-day, the heating division operates in a substantial way, being both designers and contractors for office blocks, factories, etc., whilst the plate and sheet works, now housed in modern factories, build fans, blowers, evaporative cooling towers, dust-arresting plant and associated equipment, not only for the home market, but also for exporting to many parts of the world. The company is proud of the long-service records of its staff and operatives, many of whom have over 25 years to their credit, some over 30 years and a few over 40 years. Their services were recognized at a celebration dinner last Friday.

Sheffield Firm's Expansion Scheme

Expansion scheme for Shepcote Lane Rolling Mills, Limited, Sheffield, owned jointly by Firth-Vickers Stainless Steels, Limited, and Samuel Fox & Company, Limited, has been approved by the Iron and Steel Board and the British Iron and Steel Federation. The scheme, which will cost about £2,000,000, is for the installation of new plant to meet the increasing demand for stainless steel. The expansion is primarily concerned with the extended production and increased processing facilities of stainless-steel strip in coil form.

At present the mill produces about 400 tons of coiled strip per week and it is anticipated that when the expansion programme is completed production capacity will be increased by about 50 per cent. Mr. J. T. W. Dewar, who is managing director of the company, is also managing director of Firth-Vickers Stainless Steels, and a director of the English Steel Corporation, Limited.

It is hoped to have part of the expanded production facilities available in the latter half of 1961 and the project completed by 1962. Firth-Vickers has its own warehouse and processing facilities adjoining the Shepcote Lane works and will be expanding sections of its own plant to cope with the increased production. Samuel Fox & Company has a similar plant at Stocksbridge.

Shepcote Lane Rolling Mills is one of the largest works of its kind in the world. In 1954 it began a £1,500,000 expansion programme and by the early part of 1958 had a hot mill capable of handling slabs of metal up to 8,000 lb. in weight and of rolling stainless strip up to 41½-in. wide.

itish Ironmakers d Ironfounders Abroad

By M. Schofield

he continent of Europe one often hears of pioneers who made their mark and added · country's reputation. At times, the distinc- anted is rather insignificant or even doubtful; n a Britisher of eminence has patronized h resort like Menton, or as at Offenbach the Drake statue commemorates a man ed to have introduced the potato into . But where steelmaking and ironfounding ncerned then the statues should have gone ı no uncertainty as regards the pioneers. orby it needed a German plaque to com- ate Gilchrist Thomas, that London police- lerk who dabbled with chemistry in his s and went on to banish the bogey of orus in steel. Yet in Europe the memorials sing, reminders only being stirred up by odd ts.

Welsh Founder of Stalino

rst-rate example came recently when the of Stalino showed to British journalists the where Mr. Krushchev lived when a worker efore the revolution. The house near the aps, the journalists were told, was one of uilt for workmen brought there by a British ıy headed by a Welshman John Hughes, who ed Stalino as a coal and ironmaking centre. urnalists were not told, or reminded of, hn Hughes came to this part of Russia, and xactly he came from, or were they reminded fact that Stalino was once named Yuzofka, an version of Hughesofka, a name which have perpetuated this remarkable Welsh- ho set up "Hughes's Works" to supply sian railways from St. Petersburg to Samar- with iron (most probably *wrought* iron— ı for railways.

e this pioneer came there was a vast plain, pe, with primitive peasants and *tchumaks*, ers, driving bullocks for transporting grain nging back other commodities. Then the 's came, the father and then his four sons, to this Don country to outstrip the Urals of ays, with ironworks dotted about the vast ith "the landscape lit up at night," as the as described.

the Dictionary of Biography finds no or this Hughes; though commemorating ıen with that name of less significance, a this founder of Stalino is of interest. John was born at Merthyr Tydfil, the son of a ith, and received his first training in the ks at Cyfarthfa. After much experience at w Vale works and at Llasnewydd, he estab- "mechanical factory" at Newport. But soon off to London, there to become chief er, or director, of a Millwall iron- and shipbuilding yard, to make a name for his "Millwall shield," a resistant armour-plate which was to attract the close interest of Russia.

The Czar's government needed industries for development and railways to improve transport; so there came the invitation to this Welshman who made Millwall "steel" so superior to all others. Russia had to import iron and steel from Merthyr and the Dowlais area at great cost before the idea came to bring over John Hughes to set up a Russian industry.

After an extensive tour of Russian mines and with permission to select any suitable place for establishing a full-scale iron industry, Hughes in 1869 decided to settle in the broad valley of the Donetz, a lonely place on the steppes yet not too far from the iron resources of Krivirog and from the port of Taganrog. He set up his "New Russia Company," which in a few years employed 3,000, and gave rise to a large town built for the employees. It was found essential to bring in skilled men from Britain; hence, Hughes induced a number of iron workers to emigrate from Merthyr, Dowlais, Rhymney and Middlesbrough and help in the great enterprise.

John Hughes died 70 years ago, yet his works were carried on by his four sons, with his second son Arthur becoming manager of the Hughesofka works. In 1917 the Soviet government took possession of all industrial companies, so the New Russia company was absorbed and the name of Hughesofka changed to Stalino.

Ironfounding in France

The pioneering work of John Hughes came almost a century after another example of this contribution to European iron industry from British ironfounders. This was the establishing of the great foundries of Nantes and Le Creusot by the Wilkinsons, a comparable example to that of Hughes since it was a question of armaments which brought it into being. There has been at times some confusion as to which of the Wilkinsons should be given credit; yet it is not difficult to decide that John Wilkinson was the brains behind the business, with brother William carrying out much of the supervision as manager of "the foreign business" of the Wilkinsons.

In 1774, John Wilkinson had begun his technique for boring cannon from solid castings, the casting being rotated while the boring bar was rigidly fixed—the opposite to his well-known cylinder-boring in a lathe in which the tool rotated in the normal way. In the 1770's the French were keenly interested in this method of producing cannon since their own often shattered on firing; hence the urgent request to Wilkinson to build a state ironworks, cannon foundry and boring-mill at

British Ironmakers and Ironfounders Abroad

Nantes during the period 1777 to 1780.

Before this there had been a visit by Marchant de la Houlière to the Midlands and to the Broseley works of Wilkinson, when the scheme for establishing an iron foundry in France was discussed. John Wilkinson agreed and saw in the carrying out of this foreign deal an opportunity to get rid of William who had proved such a difficult partner at Wrexham. Hence, it was William Wilkinson who actually spent much time in France from 1775 and who supervized the building of the Nantes foundry where a number of old guns dumped in French arsenals were re-melted. A coke blast-furnace was urgently wanted at this time, so that the French Minister got a Captain De Wendel to report on whether Wilkinson should continue to stay in France. Since the French government had given De Wendel a 15 years' lease on condition he got the necessary blast-furnaces built, he continued with the collaboration of William to construct plant similar to that used in Britain.

Pipe Manufacture

The Wilkinsons had by now enhanced the reputation they had in that country both for ordinance and for iron pipes and cylinders. The brothers Perrier, engineers for the Paris waterworks, gave orders to William for 40 miles of cast-iron piping. Then towards the end of the 1770's came the building of the second famous French foundry and ironworks, this at Le Creusot. Here, again, it was William who supervized the building and working of blast-furnaces there, though John Wilkinson was the leading light in the eyes of the French Minister of Marine.

An engine was successfully installed at Le Creusot (or "Creuzot" or "Creusal" according to the spelling of John), the engine when "in operation" causing "the Frenchmen to be delighted. . . . It is a complete success and the numerous visitors expressed their satisfaction. I wish you were here," wrote Wilkinson to Watt. "The French say that this Englishman (Monsieur Weelkinsong) taught them to bore cannon in order to give liberty to America" was an apt remark of Arthur Young on his travels through France.

The Creusot Royal Foundry with four blast-furnaces 39-ft. high compared with the 26-ft. height of charcoal furnaces was the foundation of modern iron smelting in France, the furnaces being first tapped in December, 1785.

So much has been written on the contributions made by craftsmen from Europe in Britain's non-ferrous metal industries that it is appropriate to emphasize the other side to the picture when iron-making and founding is concerned.

COOKE, TROUGHTON & SIMMS, LIMITED—Mr. A. H. Hird has found it necessary to resign from the board and from his office as chairman owing to the extent of his other duties within the Vickers group. Mr. R. P. H. Yapp, a director of Vickers, Limited, has been appointed a director and chairman of the company in succession to Mr. Hird.

ISI Translations

From amongst the most recently publishec
translations available from the Iron & Steel
(4, Grosvenor Gardens, London, S.W.1), the
have been selected as being of interest to foun
price quoted is that for single copies, posta
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CEGB: Central Electricity Generating Boar
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ID-U: Institut fur Dokumentation—Ubersetzur
veis, East Berlin, W.8, Unter den Linden, 8, G
CDS: *Centre de Documentation Siderurgique,*
de Lota, Paris 16, France. DSIR: Departm
Scientific and Industrial Research, 20, Chester
London, N.W.1. Where the title is quoted in a
language the original article has been translat
that language.

Equipment & Supplies

ld-curing Silicone Rubber

Midland Silicones, Limited, 68, Knightsbridge, ndon, S.W.1, have promoted cold-curing silicone bers from an experimental to a bulk-production is. With these, the addition of a small quantity of alyst converts them at room temperature into heat- ble rubbery products, no special equipment or skill ng needed. The rubbers are made in three grades: stomer 9159, of the consistency of builder's putty, ich can be moulded, milled or calendered; No. 9160, ich can be spread or applied by caulking gun; . 9161, a liquid form suitable for dipping, injection impregnating. Applications include caulking, seal- , filleting and making flexible moulds from which ins and other materials may be cast. The material be used at temperatures as high as 250 deg. C., as low as −50 deg. C., and it is said to possess ellent dielectric properties and give protection inst moisture, dust, oxidation and mechanical shock.

lt Grinder

Addison Tool Company, Limited, 28, Marshalsea ad, London, S.E.1, are now marketing a Swiss-made abrasive belt grinding machine (Fig. 1) called the Diamant 225. It is totally enclosed, and is driven by a 2½-h.p. motor running at 2,800 r.p.m. A special drawer for receiving swarf is incorporated, and all parts are readily accessible for maintenance. Working height for the unit is in., the maximum belt width being 3 in. and the length 7 ft. 4 in. One important feature is that, opening the side cover, the tension of the belt is omatically slackened for quick changing.

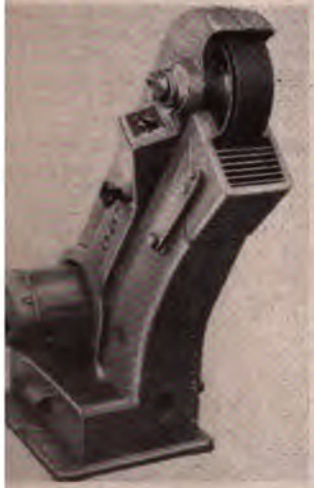

FIG. 1. — *Belt grinder marketed by Addison Tool Company, Limited, of London.*

ood-cutting Tools

The range of tools with the Surform open-toothed de has been extended by the addition of a 2-in. dia. m cutter, which was demonstrated to the Press ently by Simmonds Aerocessories, Limited, in the n's showrooms at Stornoway House, Cleveland Row, James's, London, S.W.1. In its simplest form, this ter—which carries teeth on the end as well as the side periphery—can be used for various wood tool- and forming operations, while simply mounted in ordinary portable hand-drill. Then, when the embly is fixed in a drill or lathe stand, or with ther minor attachments, a variety of precision wood- rking jobs can be accomplished, such as rebating, ning, grooving, surfacing, and routing. It is claimed t the cutter is equally serviceable for use with plastics, thus increasing its versatility in the hands of patternmakers. Except that this particular tool is not suitable for metal cutting, the design of the cutting teeth is similar to the Surform files and planes previously referred to in these columns. In the same context, it is germane to report that the same firm have now developed a hand file with a half-round blade, and also a Surcut 5-in. dia. disc-cutter for power applications.

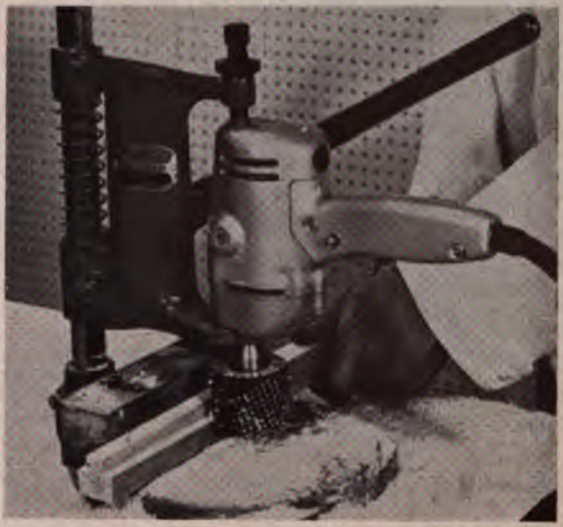

FIG. 2.—*New 2-in. dia. drum-cutter in the Surform range, shown being used for rebating when driven by a powered portable drill.*

Grinder/Sander

Atlas Copco (Great Britain), Limited, Maylands Avenue, Hemel Hempstead, Herts, have introduced an air-operated portable grinder, type LSS 62—an improved version of model LSS 61, which it supersedes. Improvements claimed include a new and patented tubular throttle to avoid power-consuming air restrictions and eliminate leakage, a hardwood handle shaped for comfort, and which maintains a comfortable temperature for the hand. A hardened front-end to the driving spindle is intended to prevent damage to the hexagon socket by the key used for tightening the wheel or brush-retaining nut. Another important feature mentioned is the special hardening and finishing of the cylinder, designed to give longer life. The machine is available with four different speeds for use on the following applications: Sanding (9-in. disc) and wire brushing at 4,500 rpm; sanding (7-in. disc) at 6,000 rpm; grinding (cup wheels) at 7,200 rpm, and with reinforced wheels for cutting-off and general grinding at 8,000 rpm.

Welding Helmets: Safety Products, Limited, Holmethorpe Avenue, Redhill, Surrey, have added Superweld welding helmets and handshields to their range of industrial safety equipment. The helmet shells are moulded in one piece from high-quality vulcanized fibre, and are tough but light. A ratchet stop gives positive alignment of the helmet in the overhead, normal and down welding positions.

Notes from the Branches

South Africa

Approximately 50 members and guests of the South African branch of the Institute of British Foundrymen visited, in October, the Isando Works of Norton Abrasives S.A. (Pty.) Limited. The party was welcomed by Mr. S. M. Gray, the company's sales manager, and then split up into small groups to visit the six main stations in the plant.

Mixing and Pressing Department

The first department to be visited was the mixing and pressing department. Here the abrasive grain and bonding ingredients are accurately weighed out according to formula, and thoroughly mixed in power mixers. The mixtures are then delivered in bulk to the pressing stations, where the precise quantity for each wheel is measured out and filled into the steel moulds while they are being rotated. After levelling off the mixture, the mould is closed with a top plate and fed into a moulding press where the mixture is compressed to form a "green" wheel. The forming pressures vary with the density of the product and are generally around ½- to 5-ton per sq. in. After pressing, the wheels are ejected from the moulds and set on batts for curing (organic) and drying (vitrified). The resinoid wheels are cured in electrical ovens at temperatures ranging from 140 to 220 deg. C., and time cycles of a few hours to several days. The oven cycle is determined by programme controllers and the temperatures held to within narrow limits. Some of the wheels when dried have to be shaped on special shaving machines. When this is completed, the "green" wheels are ready for burning or firing in the kilns where the products are set on heat-resistant Crystolon refractory batts. During the firing process the bond is fused, thereby acting on the abrasive particles to form a rigid grinding wheel. The wheels then go to the finishing department where the surfaces are trimmed by various methods to the finished shape and dimensions. The large holes are reamed to plug gauges, whilst the smaller ones are lead bushed.

Testing and Inspection

Every wheel manufactured by the company which is of 6-in. dia. or larger, is tested in a speed-testing machine at approximately one and a half times the operating speed; they are also tested for balance and counter-balance when necessary. The wheel specification, works order number and maximum operating speed are stencilled on the wheel. Finally the products are carefully inspected for size, physical imperfections, defects, etc. There is also a small laboratory testing division for checking the grade and quality of products by general methods, including the modulus of elasticity and weight per unit volume of the wheels. The storage and packing department is well equipped to deal with the 12,000 items manufactured in the factory and approximately 6,000 items are currently in stock.

The visitors were also shown the demonstration room and test room, in which is installed a cut-off machine, back stand, belt sander and tumbling department. Another division in the factory is known as the Behr-Manning Conversion Department, and this section deals with coated abrasive belts, cones, discs, etc., which are cut and processed from imported 50-yd. rolls to suit the local requirements.

At the conclusion of the visit, a cocktail party was given by the hosts and Mr. W. L. Campbell-Pitt, managing director of the company, gave a few details about the organization of the company. Mr. K. H. Coombs, branch president, thanked Mr. Campbell-Pitt and his staff for their hospitality and provision of such an informative works visit. He commented on the high standard of production and inspection and complimented the company, particularly, on the cleanliness of the plant and the obvious measures that were taken to protect the health of the staff. The vote of thanks was warmly applauded.

Natal Section

The second works visit of the newly-formed Natal section was to the Pietermaritzburg works of the Aluminium Company of South Africa (Pty.), Limited.

The works cover approximately 22 acres of which 3½ acres are under roof, and the company employs a staff of 246 Europeans and 546 Africans. The principal outlets for products are building and construction, packaging and containers, household and commercial appliances, industrial machinery and equipment, etc.

Raw Materials

The principal raw materials used are aluminium ingot, obtained from Canada and Norway, and paper imported from Finland. On an average, 1,116 tons of ingot and 312 tons of paper are kept in stock. The ingots are supplied with an analysis certificate and, from time to time, check analyses are taken at the works on arrival. The paper is also sampled before despatch from the paper mill in Finiand and, on receipt in Pietermaritzburg, is checked for substance, tearing length and burst strength, depending on the type and end use of the paper.

Melting

The three types of melting units employed are: (*a*) an oil-fired, double-hearth furnace with a capacity of 50,000 lb. and an average melting time of 10,000 lb. per hr. (*b*) Reverberatory coke-fired furnace, having a 23,000 lb. capacity and melting rate of 2,500 lb. per hr., and (*c*) a low-frequency electric-induction furnace with a capacity of 3,100 lb. and melting rate of 700 lb. per hr. The average casting temperature of the metal is 700 deg. C. This is checked by iron-constantan-type sheathed, immersion thermocouples used on all molten metal furnaces.

Metals

In all cases, aluminium is 94 to 99 per cent. of the alloy with additions of manganese or magnesium, or magnesium plus silicon, or silicon or copper or zinc. Aluminium itself is cast in purities from 99.7 to 99.3 per cent. The metal is cast into extrusion ingots, 8-in. dia. by up to 29½ in. long, or ingots for rolling, 6 by 15 by 30 in., approximately, in rectangular form. Both extrusion and rolling ingots are cast in "permanent" tilting moulds.

Heat-treatment

Aluminium pure or alloyed is the only metal heat-treated, in one or other of nine furnaces depending on the nature of the treatment. There are six batch-type annealing or ageing furnaces, two pit-type annealing furnaces and a continuous-type tunnel preheating furnace. The batch furnaces are rated at 144-200 kw. and contain loads up to 4½ tons; the rating of the pit furnaces is 140 kw. and they may contain loads up to 1½ tons; the continuous furnace can take a maximum load of 9 tons and has a 470 kw. rating.

Heat-treatment cycles consist mainly of annealing temperatures of 400 to 500 deg. C. for four to six hours. Ageing and partial annealing require temperatures of 175 to 240 deg. C. for three to nine hours, and preheating or pre-soaking requires temperatures of 500 to 575 deg. C. for eight to 14 hours. Temperature control iron/constantan thermocouples, both in the e atmosphere and in the load itself. Recording/ lling is maintained on each furnace with a iometric instrument.

London

re was a "bumper" attendance at the meeting of ondon branch, held at the Constitutional Club, umberland Avenue, London, W.C.2, on Wednes- November 18—about 150 members and visitors, present, some from quite far afield. The r for the evening was Mr. H. G. C. King (of Railways—now attached to Eastleigh Works), alked about "Patternmaking in Plastics." The f epoxy resin for the manufacture of foundry ns has been developed during the last four years British Railways locomotive works' patternshop ewe, and Mr. King's lecture was based on the ence and results obtained. It covered materials quipment required, production of master patterns oulds, and the various methods of pattern manu- e from the solid casting of small patterns to the ng of large patterns by a system of lamination.

first speaker in the discussion voiced apprecia- of the Author's work and of British Railways the lead in this making of patterns in plastics. er speaker, asking a question on behalf of inde- nt founders, asked how much more plastics ns cost than the usual wooden ones used, and ing quoted the relative costs. Why was varnish n the plaster patterns? another member of the ce asked. Mr. King said that painted patterns much better, and the increase in cost was more recently, pigmented resins had been used. mber who had had difficulty with producing resin ns asked if the original pine-wood master needed exceptionally well finished and was a special taper ed. Mr. King stressed his own version of the rymen's adage that "a plaster mould can only be d as the pattern it is produced from" and said was important—it had to be positive but need e greater than usual. With a creamed wax d to a pattern surface and with wooden wedges between the frame and the plate, it should not fficult to separate the pattern and plaster, he ht. If only 75 to 80 per cent. of filler was used in the resin, viscosity was low and air bubbles would come to the surface; machining of cured patterns, including the glass fibre embedded in them, presented no difficulty, he said. Another member thought that a file-finished cast-iron pattern could be produced more economically than a plastics pattern. Mr. King did not disagree, but said it was necessary to compare like with like; in other words, an iron plate made in that way could not be judged on the same plane as a high-quality plastics pattern. Another question concerned provision for rapping when loose-pattern moulding. Here again, the Author said he could see little point in using resin patterns for floor-moulding operations, but in response to another questioner, said that plastics patterns behaved well and were quite wear-resistant when moulds were made by impeller-type machines. Here, marble flour as a filler gave a good life and slate powder even better. The final comments by the Author included notes on safety precautions for reducing the risk of dermatitis and the need to ensure proper curing of the resins (here, a temperature of 160-180 deg. F., for six hours being stipulated.) At the conclusion of the proceedings, Mr. J. R. Booth proposed and Mr. J. P. Webster seconded a vote of thanks, which was heartily endorsed by the meeting.

Coventry Section

The dinner/dance of the Coventry section on Friday, November 27, at the Leofric Hotel, Coventry, attracted an attendance of about 200 members, guests, and their ladies, including a large number from the parent branch. It was a very well-organized and colourful affair. In addition to other prominent personages and guests, at the high table, the section president, Mr. T. Player, and his lady were accompanied by the national president, Mr. C. H. Wilson, and Mrs. Wilson. It was very fitting that Mr. E. Player, C.B.E. (deputy chairman and managing director, Birmid Industries, Limited) the president's father, was called upon at speech time to propose the toast of "The Institute and the Section." Mr. Player from his long experience quoted examples of the way the Institute took very seriously its mission of expanding knowledge of the foundry industry and its dissemination to members. The response was made by Mr. Player, jnr., who referred also to a telegram of apology for absence received from Mr. Tom Weaver. "The Guests" were toasted by Mr. D. F. Bailey, who named amongst those he welcomed, not only Mr. Player senr., but also the national president and national vice-presidents of the Institute (Mr. C. H. Wilson and Mr. G. R. Shotton) with Mr. A. R. Parkes of the FOUNDRY TRADE JOURNAL and their ladies. In this case, the response was made by Mr. Wilson. To conclude the speeches, the section president expressed the thanks of

Group photograph taken at the Coventry section, IBF dinner. From left to right: Mr. G. R. Shotton, Mrs. Shotton, Mrs. T. Player, Mr. C. H. Wilson, Mrs. Wilson, Mr. T. Player, Mrs. E. Player and Mr. E. Player.

Notes from the Branches

the gathering to the sub-committee, headed by Mr. Bernard Pearson, who had organized the function. Dancing until 2 a.m. under the able direction of joint masters of ceremony, Mr. D. F. Bailey and Mr. D. R. Fardoe, continued this most successful function.

Australia (Victoria)

The Australia (Victoria) branch held its October meeting at the Metallurgy Theatre, Royal Melbourne Technical College, when members heard a paper from Mr. D. G. Evans, Mr. R. S. Higgins and Mr. G. L. Kennedy, on the subject of "Brown Coal Char as a Fuel for Foundry Cupolas." This lecture constituted the official exchange paper to the IBF Scarborough conference this year.

Allied Ironfounders' Expansion

One of the country's largest producers of heavy domestic equipment with interests up to now principally in ironfounding, Allied Ironfounders, Limited, is to expand its steel interests. The company is to take over with immediate effect the UK manufacture of a flail forage harvester of US design and, as part of its plans to move further into the agricultural machinery field, it is to set up a steel-fabricating plant within the next 12 months.

Manufacture of the forage harvester will be through Lundell (Great Britain), Limited, in which Allied Ironfounders has now acquired a 75 per cent. interest. Lundell, a small British private company at Lingfield (Surrey), has been making the flail forage harvester in this country for three years under franchise to an American company.

Plans for the group's steel-fabricating plant are not yet complete and the company is unable to give an indication of its size or cost. There will be employment, however, for several hundred people and the output will at first be mainly for the group's new range of agricultural machinery.

Long-service Presentations at Weir's

Each of 102 employees with 40 years or more service with G. & J. Weir, engineers, Glasgow, was presented with an inscribed gold watch by the chairman, the Viscount Weir, C.B.E., at a meeting at the Cathcart Works of the company on December 7. The employees came from all sections of the company, and amongst the 15 women and 87 men were the managing director and the works director; with the exception of five, all are still working with the company. The annual presentation of long-service awards is an old-established custom at Weir's, and formerly employees had to complete 50 years, in August last, however, the qualifying period was reduced to 40 years. It is interesting to note that for works personnel the average length of service is 44 years, and for office staff, 42.6 years; the aggregate score of the 102 employees is 4,416 years!

Export Opportunities

Details of equipment and machinery required by "Döküмäy Dokum Pres Emay, Limited, Sti., Sirkeci Palas 7-8, Sirkeci, Istanbul, Turkey, for their foundry and enamelling works at which baths, wash-basins, etc., are to be made, are obtainable from the Export Services Branch of the Board of Trade, Lacon House, Theobalds Road, London, W.C.1. Reference No. *ESB/28034/59.*

Hot-blast Cupolas

*"Best Practicable Means" for dealing with Fume, Grit and Dust**

The Chief Alkali Inspector for England and Wales has discussed with the Clean Air Panel of the Joint Iron Council (representing the ironfounding industry) measures for treating the emission of fume, grit and dust from hot-blast cupolas. It was agreed that the following could be considered as the provisional "best practicable means" within the meaning of the Alkali Act:—

(1) The discharge of fume is to be dealt with by dispersion through chimneys of normal minimum height of 120 ft. For cupolas melting at a rate of 7 tons per hour or less, consideration will be given to the use of chimney heights down to a minimum of 80 ft., depending upon site conditions.

(2) For externally-fired hot-blast cupolas above 7 tons per hour capacity and cupolas of all sizes using recuperative hot-blast systems:

During the main operating period, approximately 90 per cent. of the effluent gas shall be extracted, passed through a powered cyclone and discharged into a chimney of suitable height. The remainder of the gas during this period shall pass through a suitable arrester at the top of the cupola stack.

During the blow-down period as much of the furnace gas as practicable shall be passed through the cyclone/chimney system. In cases where it is not practicable to pass any part of the gas through the cyclone/chimney system, then it shall be permissible for the whole of the gas to be discharged through an arrester installed at the top of the cupola stack. During this period dry- or wet-arresters are acceptable alternatives.

(3) For externally-fired hot-blast cupolas up to 7 tons per hour:

The provision of a dust-leg (*i.e.*, an expansion chamber operated by the stack draught only) and a chimney of a minimum height of 80 ft. taking 100 per cent. of the cupola gases during the blow-down period as well as the main operating period. Where installations approach the 7 tons per hour figure and especially those in populous areas the Chief Inspector may ask for more efficient means of dust arrestment.

Companies contemplating the installation of hot-blast for cupola operation are advised to get in touch with their district Alkali Inspector, a list of these being recorded below.

District Alkali Inspectors.

	Telephone number
Mr. J. Beighton, 3 Warwick Avenue, Bromsgrove, Worcestershire	Bromsgrove 3022
Mr. H. Brigg, 2 Ashwood Avenue, Sale, Manchester	Sale 9800
Mr. J. E. Colehan, 13 Edward Road South, Walton St. Mary, Clevedon, Somerset	Clevedon 2891
Dr. E. T. J. Fuge, West House, South Terrace, Gainford, near Darlington	Gainford 251
Dr. W. E. Grant, 184 Gilbert Road, Cambridge	Cambridge 54613
Mr. H. Heron, 16 Watlands Avenue, Wolstanton, Newcastle, Staffs	Newcastle, Staffs 51743
Dr. L. E. Hockin, 58 Sutherland Avenue, Petts Wood, Kent	Orpington 2218
Mr. L. W. Mullinger, 21 Hillcrest Road, Great Crosby, Liverpool, 23	Great Crosby 2439
Mr. R. L. Pawson, 24 Twentywell Road, Dore, Sheffield	Sheffield 72013
Mr. J. C. Peabody, Llandough House, Llandough, Cardiff	Penarth 59481
Mr. J. Swaine, Wharfedale House, 271 High Street, Boston Spa, Yorks	
Mr. G. Tiplady, O.B.E., 36 Spring Street, Hyde Park, London, W.2	AMbassador 9925

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* Communication received from the Council of Ironfoundry Associations representing an official statement of the present position. It is understood that in normal circumstances chimney height is measured from ground level and that externally-fired hot-blast cupolas are cupolas for which the blast is independently heated.—Editor

Law Cases

ıt Rating Decision

n of importance to scientific and technical
ns which have been granted rating ex-
under the Scientific Societies Act, 1843, has
e by the Court of Appeal, which has ruled that
ıtion of Mechanical Engineers was not formed
oses of science exclusively and is therefore
led to rating exemption for its premises in
Walk, London, S.W.1.

urt allowed an appeal by the Inland Revenue
minster City Council from a decision of the
ibunal holding that the Institution was en-
rating exemption. The assessment on the
's premises was £6,000 gross, £4,977 rateable.

ustice Hodson (who sat with Lord Justice
and Mr. Justice Wynn-Parry) giving the
of the court, said each case had to be con-
ccording to the terms of its charter. The
was constituted to "promote the develop-
mechanical engineering." In the court's
those words had a wider meaning than to
the development of mechanical science,"
efore the Institution was not formed for
of science exclusively.

ourt also held that the Institution failed to
ith another condition of the 1843 Act in that
ot supported wholly or in part by annual
contributions. Lord Hodson said it was
e to ignore the fact that many of the Institu-
ivities were an inducement to potential mem-
join. They included educational work, an
ents bureau, and a model contract for use
ering projects.

o appeal to the House of Lords was granted.

ucceeds

ourt of Appeal has allowed with costs an
Joseph Lucas, Limited, Birmingham, from
nt given by Mr. Justice Wrangham at Birming-
ze, ordering the firm to pay £448 damages
to Mr. Ivor Leonard Turvey, a toolsetter
by the company, for an injury incurred at
August, 1954.

ustice Hodson said that ribbons of steel used
a press from time to time. Turvey's case
in attempting to free the press he had to use
e that he sustained a hernia. His Lordship
the trial judge at first thought there had been
nce by the firm, but changed his mind after
vidence from an expert witness. Lord Justice
aid, however, that in his view the trial judge
in his first conclusion and there was nothing
pert's evidence to cause him to alter it. The
e, he said, had given the wrong significance
idence and clearly there had been no reason
an injury to Turvey. Lord Justice Ormerod
Justice N. Gorman agreed.

r Loss of Toe

gow labourer, Mr. Daniel Fagan, whose toe
amputated after a 7-ft. long moulding case
s right foot, was awarded £1,250 damages by
ing with Lord Guest in the Court of Session
rgh on December 4.

gan, who had sued his employers, Walter
ne & Company, Limited, Saracen Foundry,
, Glasgow, for £2,000, said he was moving
boxes from a conveyor belt at the foundry
t 18, 1956, when a box fell on his foot. He
at the accident was caused by the fault and negligence of his employers in failing to provide a safe system of working. The firm denied liability and maintained that the accident was caused or contributed to by Fagan's own fault and negligence.

Overalls caught in Machine

Damages of £3,800 and costs were awarded by Mr. Justice Wrangham at Sheffield Assizes to Mr. Henry Foster (51), a turner, who was dragged into a machine when a piece of equipment caught the collar of his overalls. The judge found no evidence of contributory negligence on the part of the plaintiff.

Mr. Foster, who claimed against his employers, Hadfields, Limited, steelmakers, of Sheffield, said the accident would not have happened had the lathe not been in such a "decrepit" condition. Shop foreman, Mr. Cyril Antcliffe, said Mr. Foster was wrong to try to free a loose plate. He should have stopped the machine.

Lack of Instruction

Giving judgment in an action at Wolverhampton County Court, Judge E. G. H. Beresford said that Brockhouse Castings, Limited, Wednesfield (Staffs), had failed to give Mr. John William Thompson (25), a former employee, instruction on how to face an unusual problem. Mr. Thompson was awarded £169 damages, including £69 for loss of wages.

The plaintiff had to empty boxes brought by overhead crane on to his moulding machine. On the day in question the crane could not reach his machine properly; the moulding box fell and broke three of his toes.

At an inquest at Rowley Regis on December 4, the jury returned a verdict of "Accidental Death" on Pretam Singh (32) who fell through a waste-sand hopper and was buried under several tons of sand and rubble at the works of the Repton Foundry (Tipton), Limited. The fatality occurred on December 1. Mr. Leonard Thomas Parry, who had called at the foundry to collect waste sand, told the court that when the hopper stopped running he went to the intake end and saw Singh standing on a pile of rubble over the open side of the hopper. He beckoned him to come off. While still standing on the pile of rubble, Singh began poking the pile with a bar.

Mr. Joseph Skeldon said that he had seen Singh standing on the rubble pile more than once and had warned him of the danger. Mr. Joseph Goodridge, assistant managing director of the Repton Foundry, Limited, said that since the accident, a fence had been put up to separate the grid from the open part of the hopper. He had never had any adverse comment from the factory inspector about the hopper, he added. At the speed the sand went through, he could not visualize anyone standing on the top. He was not aware that workmen did this when the hopper became jammed. It would be a highly dangerous practice, he said.

Thos. W. Ward, Limited, Sheffield, are to begin the dismantling of the world-famous Swansea to Oystermouth railway early in January, 1960. The line, claimed to be the world's oldest passenger-carrying railway and recently known as the "rock 'n roll" line, is closing down after 153 years. During its history it has had seven forms of motive power—horse, air, steam-locomotive, battery railcar, petrol-locomotive, diesel locomotive and overhead-electric traction. The railway once carried 1,800 people in a single train, but buses have now taken the trade. The owners estimated it would have cost £350,000 to put it on a sound footing.

Company News

Chamberlin & Hill, Limited, grey-iron founders, of Walsall—The interim for the year to March 31, 1960, has been raised to 6¼ (5) per cent. The company's two foundries are working to capacity and the prospects for the remainder of the financial year appear to be good.

J. Brockhouse & Company, Limited, iron- and steel-founders, dropforgers, etc., of West Bromwich—The South African subsidiary company, J. Brockhouse (South Africa), Limited has advised shareholders to accept the offer by the parent company of 5s. 6d. for the 5s. ordinary. The offer closes on December 15.

Glacier Metal Company, Limited—After a full reappraisal of the situation, the board has decided that the financial requirements of the company can best be met for the early future by means of bank borrowing. The company has arranged with its bankers for overdraft facilities up to the limit of permitted borrowing.

General Electric Company, Limited—The British General Electric Company of Japan has been formed in connection with the company's nuclear power-station project in Japan. Although a letter of intent for the construction of a nuclear power-station was signed early this year, the company is still waiting for the Japanese to sign a contract.

Metropolitan-Cammell Carriage & Wagon Company, Limited—An interest has been acquired in Union Carriage & Wagon, Transvaal, a subsidiary of Commonwealth Engineering, Australia. The two companies have joined forces to execute a large coach order received by Union Carriage & Wagon from the South African Railways.

Hills (West Bromwich), Limited, manufacturers and engineers to the building trades—Preference dividend has been paid for the year ended July 31, 1959, but there is no dividend on the ordinary, as previously. There was a group loss of £28,621 (£28,352 after crediting tax relief of £11,737) and there was no tax (profits tax of £2,058 previously).

Laporte Industries, Limited—The company is to spend £3,500,000 on additions to the capacity of its subsidiary, Laporte Titanium, Limited, at its Stallingborough (Lincs) titanium oxide plant. The expansion, which is expected to be financed out of group resources, will raise capacity from 30,000 tons to 50,000 tons a year over a period of three years.

Gas Purification & Chemical Company, Limited—Unaudited net profit, before tax, for the first four months of the current year was £305,000. Announcing this, the chairman, Vice-Admiral Sir Charles H. Hallett, said that profits were even higher in the following four weeks, the carry-over deficit on the balance-sheet had been entirely wiped out, and a loan of £100,000 had been repaid. It was intended to declare an interim dividend in January in respect of the current year.

Indian Iron & Steel Company, Limited—The chairman, Sir Biren Mookerjee, deplores low productivity enforced by compulsory retention in employment of superfluous labour and a High Court ruling that renovation, rationalization, or mechanization cannot be allowed at the expense of labour. Net profit for the year to March 31, 1959, was £131,209 (£134,864) and the dividend is maintained at 10 per cent.

Metal Industries, Limited—In order to reduce the disparity between interim and final payments, the directors are raising the current year's interim to 6 (4) per cent. They forecast an increase of 1 per cent. on the 14 per cent. total, provided present trends continue. Group profits for the half year to October 17 are £850,000 (£679,000), tax is estimated at £414,000 (£356,000), and the balance is £436,000 (£323,000).

Triplex Foundry, Limited—Mr. W. H. L. Harrison, chairman, reports that with the ferrous foundry gathering momentum, earning capacity is increasing. The outlook for the non-ferrous side is a little clouded at the moment, for, although order-books are full, the price of secondary aluminium ingots continues to rise and with every increase the profit margin tends to fall. Generally, however, the group is well placed for business.

Belliss & Morcom, Limited, engine and turbine builders, etc., of Birmingham—In view of the first six months' trading, the directors do not feel justified in distributing more than a 3 (4) per cent. interim. They consider, however, that the full year's results to March 31, 1960, could be comparable with those of the previous year. For 1958-59 a final dividend of 4 per cent. was accompanied by a 2½ per cent., net, capital distribution.

Broom & Wade, Limited, manufacturers of air compressors and pneumatic tools, etc., of High Wycombe—A one-for-two scrip issue is proposed to ordinary stockholders registered February 3. The dividend is effectively raised to 22½ per cent. with a 20 per cent. final for the year ended September 30, 1959. Group profits rose to £851,858 (£569,434), tax accounts for £415,935 (£306,259), and the net profit is £435,923 (£263,175).

H. W. Kearns & Company, Limited, machine-tool makers, etc., of Altrincham (Ches)—Even if trade does not improve further, says the chairman, Sir Harry W. L. Kearns, results for the current financial year should be similar to those for 1958-59, and the directors hope to be able to recommend the payment of similar dividends. The order-book at the end of September last still represented 11 months' work and in the last quarter orders were a little more plentiful.

Yarrow & Company, Limited, shipbuilders, engineers, and boilermakers, of Glasgow—Shareholders must not assume from the maintenance of the 17½ per cent. dividend for the year to June 30, 1959, on increased capital (an effective rise of 3½ per cent.) that the larger profit will necessarily be maintained. Group net profit was £315,646 (£199,518). During the last five years more than £1,000,000 has been spent on a general scheme of modernization and development which is now nearly complete.

Fairfield Shipbuilding & Engineering Company, Limited—Improvement in results—the trading profit rose to £1,008,911 (£676,450) for the year to June 30, 1959—reflected the policy of ploughing back profits to enable all departments to utilize fully new and improved techniques. The company is a member of the Mitchell-Fairfield-Combustion Engineering consortium to develop marine nuclear propulsion and it is considered that the company could now undertake a nuclear propulsion unit "with confidence." The dividend is raised to 20 (10) per cent.

Anderston Foundry Company, Limited—The board announces that as the capital employed in the business is very much less than has been required in recent years, it is proposed to repay to the shareholders 15s. per £1 share. It is also intimated that the directors have decided to await the full trading results for the year ending March 31, 1960, before considering the question of a dividend. There has been "a severe reduction" in the demand for one of the company's principal products and at the present time the works are operating considerably below normal capacity.

News in Brief

Mr. H. Humphries, managing director of Hadfields Limited, Sheffield, opened the Christmas Bazaar at Carbrook Church, Sheffield on November 28.

The staff of the Journal congratulates its esteemed contemporary, *Metal Industry*, on the attainment of its Golden Jubilee. A special issue of the magazine has been published to commemorate the occasion.

Because their present premises in Wolverhampton are not large enough, Frisky Cars (1959), Limited, are to move in the spring to a new factory to be built at Penkridge, Staffs. The firm has acquired 30 acres of land.

Card Clothing and Belting, Limited, West Grove Mill, Halifax, Yorkshire, are arranging to arquire the while of the issued capital of Francis W. Birkett & Sons, Limited, brassfounders and engineers, Hightown Road Halifax.

Colchester Lathe Company, Essex, one of the 600 Group of Companies, has over the last two months taken export orders to a total value of over £300,000. The machines are to go to 38 different countries.

East Sussex Engineering Company, Limited, Phoenix Iron Works, Lewes, Sussex, in order to give a better service to their customers in the London area, have opened an office at 270 Upper Tooting Road, London, S.W.17.

A year after its opening, the £3,000,000 Barrow-in-Furness factory of British Cellophane, Limited, is to be extended. About 100 additional workers will be employed when the new plant comes into operation about the middle of 1960.

Three employees of Brightside Engineering Holdings, Limited, Sheffield, were presented with gold watches in recognition of their 50 years' service each with the firm, at the annual whist drive and dance at the Cutlers' Hall on December 2.

The Heavy Plant Division, Rugby, of Associated Electrical Industries, has secured an order worth £190,000 for a large turbine-driven centrifugal blower for a catalytic-cracking plant in the new Duque de Caxias Oil Refinery at Rio de Janeiro.

Fleming & Ferguson, Limited, shipbuilders, Paisley, are to supply the steam-propelling machinery for biggest grab-hopper vessel to be built for the Port of London. The dredger will be 264-ft. long, 45-ft. wide, and will have a hopper capacity of 2,000 tons.

Venezuelan iron-ore production during the first half of 1959 totalled 7,980,000 *tonnes*, of which 83½ per cent. were accounted for by the Orinoco Mining Company—a subsidiary of U.S. Steel Company—and 16½ per cent. by the Iron Mines Company of Venezuela (Bethlehem Steel Company).

Sheffield area employees seem to be the most contented in the country, said Mr. S. H. Coplestone, home sales manager of W. and T. Avery, Limited, weighing and testing machines, at the annual dinner of the Sheffield branch social society in the Cutlers' Hall, Sheffield, on December 4.

International Harvester Company, Limited, Doncaster, is providing their 3,000 employees with free anti-influenza vaccination. Because of absenteeism through influenza in previous winters the firm offered a vaccination service and about 70 per cent. of the employees said they would take advantage of it.

At the eleventh annual dinner of the supervisory staff of Sheepbridge Engineering, Limited, held on November 21, gold watches were presented to 15 men employed by Sheepbridge Equipment, Limited and Sheepbridge Stokes, Limited in recognition of completion of 25 years' service. This brings the total of presentations in the group to 543.

The *Federation Europeenne de la Manutention* (European Mechanical Handling Federation) through its British national committee, 94/98, Petty France, London, S.W.1, has prepared a brief description of the activities and functions of the Federation, and this is available to readers on writing to the secretaries, Peat & Company at the above address.

Major C. R. Dibben, chairman of Midland Aluminium, Limited, told shareholders in Birmingham, on December 3, that arrangements are now being made in conjunction with Aluminium Union, Limited, for the establishment of a company under the title Tower Aluminium (Nigeria), Limited, for the manufacture of hollowarc and other products in Nigeria.

A contract from Norway for a 108,000 kw rectifier installation, believed to be the largest of its kind yet ordered, has been obtained by the heavy plant division of Associated Electrical Industries, Limited. The order, which covers semi-rectifier equipment rated at 135,000 amps, 800 volts, d.c., has been placed by A/S Ardal og Sunndal Verk, the largest producer of aluminium in Norway.

A factory for the production of cars for Common Market countries is to be built by Standard Triumph International, Limited, near Brussels, says Lord Tedder in his statement to shareholders. Plans have been approved and work is to start immediately. £6,000,000 is being spent on a new final assembly plant, new offices and the modernization of the engine gear-box and axle plant.

National Carbon Philippines Inc. has announced that the first Philippine-made ferro-alloys are being produced by the company's subsidiary, Maria Cristina Chemical Industries Inc. (National Carbon is an affiliate of Union Carbide International). These alloys are now available in commercial quantities from the firm's Iligan plant. They come in two types: 75 per cent. ferro-silicon and high-carbon ferro-manganese.

Newton Chambers and Company, Limited, Thorncliffe, Sheffield, are to build a new chemical works and central laboratory block at a cost of £300,000. It will replace the existing Norfolk Works, and work on the site will begin early in 1960. The new works will cover an area of 92,520 sq. ft. and there will be a despatch bay of 10,000 sq. ft. Most of the new manufacturing plant will be made at Thorncliffe.

Brayshaw Furnaces, Limited, and Brayshaw Tools, Limited, West Gorton, Manchester, have now completed a large building programme consequent upon their operation as separate entities. New office accommodation has been made available and new layout and plant in the works departments. The managing director is Mr. W. G. Pallett, of Sheffield, formerly managing director of Laycock Engineering, Limited, Sheffield.

Mr. J. Spark, works manager at the Doncaster works of British Railways, presented the original nameplate of the football-class locomotive, "Sheffield Wednesday," No. 61661, to the Sheffield Wednesday Football Club at a ceremony at the Royal Victoria Hotel, Sheffield, on November 25. The nameplate was burnished and inscribed. The locomotive was built at the Doncaster works before the war and has now been dismantled there.

Tenants of 130 council houses at Stocksbridge, near Sheffield, using coke-fired central-heating systems, *News in Brief*

are being asked to comment on them in a survey to assist the Council in their consideration of the installation of central heating on the East Whitwell new housing estate. Mr. D. E. Robinson, the Stocksbridge surveyor, is preparing a statement of the comparative capital cost and running costs of gas, electric and water heating systems.

A NEW FACTORY for Moore & Wright (Sheffield), Limited, at Handsworth, near Sheffield, was opened by Sir Frank Lee, Permanent Secretary to the Board of Trade, on December 1. The new factory has nine roof bays each 525-ft. long by 31-ft. wide. Heating is provided by high-pressure radiant hot-water panels suspended from the roof. There is seating accommodation for 400 in the works canteen, and for nearly 100 in the staff dining room.

YORKSHIRE ENGINE COMPANY, LIMITED, Wincobank, Sheffield, has secured an order worth nearly £72,000 from the general chemicals division of Imperial Chemical Industries, Limited, for five 220 h.p. diesel-hydraulic locomotives. The order, gained in the face of strong competition after over three years' negotiations, is the first substantial one for these new model locomotives and the first for tandem working. They are to be delivered in 1960.

A TAKE-OVER OFFER is being considered by shareholders in the Harborough Construction Company, Limited, of Logan-street, Market Harborough, Leicestershire. About 200 workers are employed at the factory, where the National Aircraft Company started business in 1936. Subsequently the name was changed to the Harborough Aircraft Construction Company, Limited, and about 15 years ago the word "Aircraft" was deleted from the company's name.

THE SMITH TOOL COMPANY, of California, USA, have decided to take over a factory at Blantyre, Lanarkshire, and will employ initially 250 workers in the manufacture of bits for drilling industries. The company, leading manufacturers of drilling bits for the petroleum, mining and water-well drilling industries, will occupy a factory previously used by the development department of the Rolls-Royce aero-engine division, which has returned to East Kilbride.

SURIGAO CONSOLIDATED MINING COMPANY, Philippines, has acquired three copper and two iron properties, according to the company president, Mr. Otto F. Weber. The newly-acquired concessions are: Guimaras copper property, Pangasinan copper properties, Lluch copper property and Sta. Teresita and Pioneer Iron properties. Negotiations have been opened with a Japanese company to finance the development of the iron properties.

GEORGE TUCKER & COMPANY (SHEFFIELD), LIMITED, non-ferrous and ferrous metal stockists, 51, Norfolk Street, Sheffield, have opened a new warehouse in Shoreham Street, Sheffield. The firm traces its origins back to about 1786 when John Hoyland was a "factor and dealer in metal and steel" in York Street, Sheffield. The business was bought by George Tucker in 1840 and taken over by the Biggin family in 1876. The Tucker group now consists of five companies.

SIR CYRIL MUSGRAVE, chairman of the Iron and Steel Board, made a two-day visit to Sheffield on November 26 and 27, when he was the guest of Mr. Lewis Chapman, chairman of Jessop-Saville, Limited, and president of the British Iron and Steel Federation. Sir Cyril Musgrave also visited Steel Peech & Tozer, Rotherham, Firth-Vickers Stainless Steels, Limited, and the English Steel Corporation, Limited, and attended a dinner at which heads of steel firms were present.

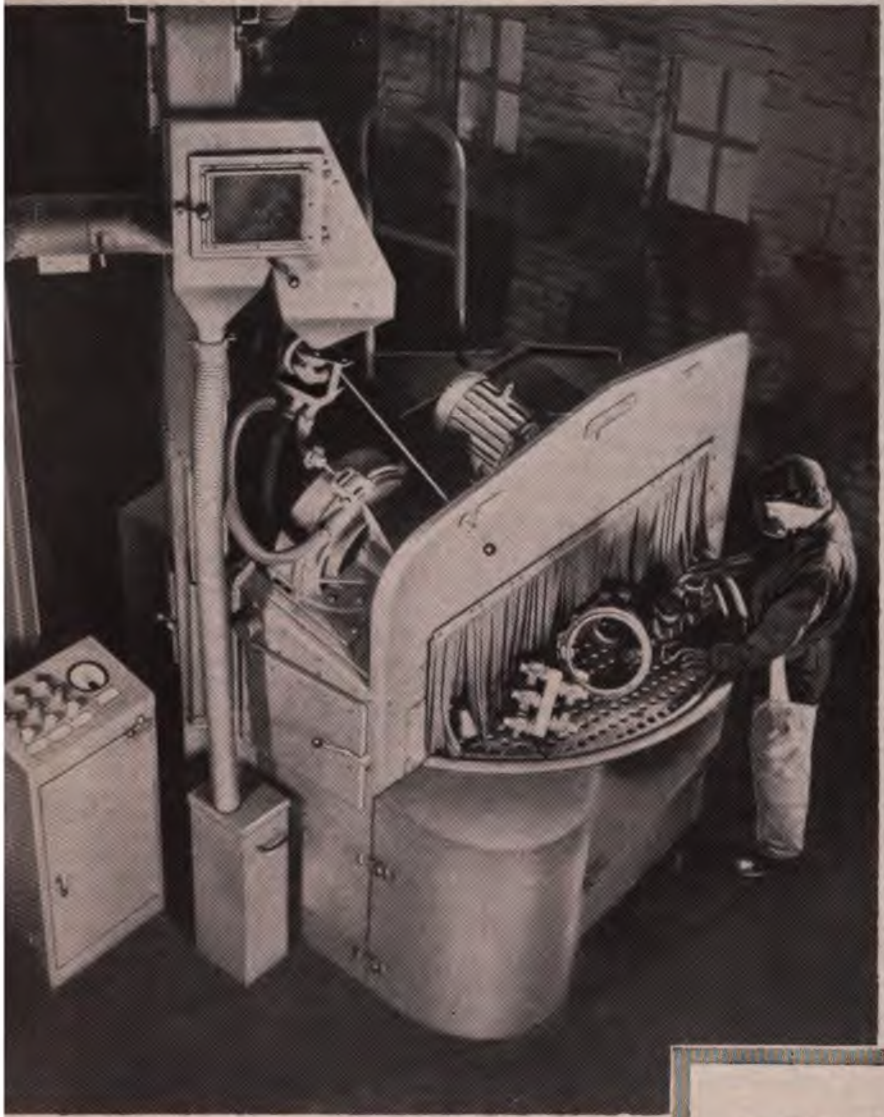
WITH AN EXPORT TRADE already amounting to over £200,000 annually and covering some 27 countries, the Marshall Refractories Group, Sheffield, are further increasing their activities in the export markets. The firm now reports orders have been received to the value of £8,600 from Dominion Steel & Coal, Dominion Foundries & Steel and Canadian Steel Wheel. According to the company these orders indicate a readiness on the part of Canadian companies to buy British rather than from their nearest neighbours, the Americans, as has normally been the practice.

SPEAKING AT THE PRESENTATION of further education awards to employees of the English Steel Corporation, Limited, Mr. H. Parkin, education and training officer, said that the Corporation had increased its intake of school-leavers in Sheffield from 760 in 1956 to 880 this year. He also said that an extension of the training workshop, completed in the year, had enabled the company to provide training for 100 apprentices for a period of up to two years, and at the same time to give part-time training to 75 probationers. During the year, 520 young people had attended part-time courses, five had attended sandwich courses, four had been on full-time courses at university, and two had undergone full-time post-graduate courses. This was a vast change from 1956 when only two students attended part-time courses.

UNDER AN AGREEMENT with the Marion Power Shovel Company, Marion (Ohio), a division of the Universal Marion Corporation, Babcock & Wilcox, Limited, is to manufacture Marion excavators and cranes in several models at its recently acquired Dalmuir, Glasgow, works. The machines will be marketed and served by Blackwood, Hodge & Company, Limited, London, W.1. The Babcock & Wilcox factory at Renfrew is among the world's largest manufacturing plants devoted to the production of land and marine boiler plant and auxiliary equipment. Machine work, fabrication, and assembly will be carried out at the Dalmuir plant, which, prior to its acquisition earlier this year, had been producing armoured fighting vehicles and tanks for the Royal Ordnance Department. Since its acquisition by Babcock & Wilcox the facilities at Dalmuir have been extended and the plant has been producing industrial cranes, nuclear power plant, and other heavy equipment. Among the products of the Marion Power Shovel Company are diesel- and electric-powered shovels and cranes and draglines ranging in size from 3 to 4 yds. to the world's largest 65- and 70-yd. stripping shovels.

Recent Wills

FRASER, ALEXANDER, former vice-chairman and managing director of Girling, Limited, brake manufacturers, of Birmingham	£47,5[illegible]
THOMPSON, W. J., former chairman of the John Thompson, Limited, Wolverhampton group of heavy engineering companies	£44,3[illegible]
COOPER, CHARLES, former joint managing director and head of the gas and chemical engineering division of W. C. Holmes & Company, Limited, Turnbridge, Huddersfield, an honorary life member of the Coke Oven Managers' Association ..	£[illegible]
BUTTERFIELD, J. W., secretary of Leach & Thompson, Limited, iron and non-ferrous founders, of Keighley (Yorks)	£[illegible]
HURST, DR. J. E., formerly managing director of Bradley & Foster, Limited, Darlaston (Staffs), and a director of the Staveley Coal & Iron Company, Limited, and other companies, past-president of the Institute of British Foundrymen, the Staffordshire Iron and Steel Institute, the British Cast Iron Research Association, and the Institute of Vitreous Enamellers, and founder Fellow of the Institution of Metallurgists	£[illegible]



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Note especially the control desk which includes signal
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HISTORICAL NOTE
Peter Brotherhood Ltd. were established in London in 1868. In 1907, the works was transferred to Peterborough, Northants. In their Foundry, they produce a wide range of general engineering castings for air and gas compressors, steam turbines, steam engines, refrigeration plant, water turbines, chemical filtration plants, textile machinery, brewery machinery, and many other applications

Personal

Mr. J. McNay has been appointed a director of Federated Foundries, Limited. He will continue as secretary.

Mr. S. C. Pearson, assistant general manager of the Consett Iron Company, Limited, has been appointed a director.

Mr. Douglas A. Smith has been appointed managing director of Weir Valves, Limited, a subsidiary of G. & J. Weir Holdings, Limited, of Glasgow.

After 51 years' service in the foundries of Newton Chambers & Company, Limited, Thorncliffe Works, Chapeltown, Mr. Adrian Crossland has retired.

Mr. Peter Thomas, Parliamentary Secretary, Ministry of Labour, has appointed Mr. M. D. Craig to be his Private Secretary, in succession to Mr. K. R. Cooper.

Mr. F. R. Bond has been appointed a director of Worthington-Simpson, Limited, and continues as secretary. Mr. H. D. Jenvey has been appointed assistant secretary.

Mr. T. B. Ellis has been appointed secretary of the General Electric Company, Limited. He succeeds Mr. T. B. O. Kerr, who was recently appointed director for finance and administration.

Mr. J. O. Charlton has been appointed secretary, and Wing Commander J. L. Dell deputy chief test pilot of English Electric Aviation, Limited, a subsidiary of the English Electric Company, Limited.

Mr. R. H. Coverley, general manager of the Weyburn Engineering Company, Limited, has joined the board of the company. Mr. J. Black, works manager, will join the board on December 30.

Mr. James Graham, foreman of the despatch department, Goodwin Barsby & Company, Limited, St. Margaret's Ironworks, Leicester, has been installed as president of the firm's Quarter Century Club.

Mr. J. O. Knowles, a director of Metal Industries, Limited, has been elected chairman of the British National Committee of the International Electrotechnical Commission. He succeeds Colonel B. H. Leeson, who has resigned.

A Local Management Forum has been formed in Letchworth, Herts, and Mr. R. C. M. Callaghan, personnel director of K. & L. Steelfounders & Engineers, Limited, has been elected chairman of the steering committee.

Mr. David Farrar has been elected to the board and appointed joint managing director of Ormerod Shapers, Limited, machine-tool manufacturers, Hebden Bridge, Yorks, a subsidiary of Asquith Machine Tool Corporation, Limited.

Mr. James William Eldridge, Midland Regional Controller for the Ministry of Labour, is to retire at the end of the year. He will be succeeded by Mr. Clifford J. German, Regional Controller for the East and West Ridings of Yorkshire.

The Society of Chemical Industry announces that the fifth Ivan Levinstein Memorial Lecture will be given by Mr. L. H. Williams on Friday, February 5, 1960, in Manchester. The title of the lecture will be "The Future of Chemicals from Petroleum."

Mr. Harold Riggall, managing director of Ruston & Hornsby, Limited, engineers, Lincoln, left by air on Sunday, November 22, for Bombay, to be a guest at celebrations for the centenary of Greaves Cotton, Limited, the company's agents in India.

Mr. J. T. W. Dewar, managing director of Firth-Vickers Stainless Steels, Limited, Tinsley, Sheffield, presented gold watches to Mr. H. Spencer and Mr. C. H. Hawksworth on their completion of 50 years' service with the firm on November 27.

Tube Investments, Limited, announce that Mr. Bryan Harris, a graduate in metallurgy from the University of Birmingham, has been appointed to a TI research fellowship for work in the physics and chemistry of solids, at the Cavendish Laboratory, Cambridge.

Dr. Charles Sykes, managing director of Thos. Firth & John Brown, Limited, Sheffield, has been appointed chairman of a working party to consider the amalgamation of the research organizations for cotton and rayon. He was also recently appointed to the Royal Ordnance Factories Board.

To increase their technical representation in Scotland, Sir W. H. Bailey & Company, Limited (Patricroft, Manchester) have appointed Mr. R. N. Bartley, North Eastern counties representative, to be responsible for Scotland also. His address is 79, Ravensbourne Avenue, East Boldon, Co. Durham.

Sir Leslie Rowan, a director of Vickers, Limited, has been appointed chairman of Robert Boby, Limited, a subsidiary of Vickers. He succeeds Mr. A. H. Hird, who has resigned as chairman and as a director of that company because of the extent of his other commitments within the Vickers group.

Mr. B. S. Prichard has relinquished his office as managing director of Patent Shaft Steel Works, Limited, of Wednesbury. He will in future be director responsible for sales and commercial development. Mr. Bryan Bruce-Gardner, a director of the company, has been appointed general manager.

Mr. L. N. Bowley, production director of Crane's Screw & Colgryp Caster Company, Limited, Bordesley, Birmingham, has been elected the new chairman of the Birmingham area of the National Union of Manufacturers. Mr. A. N. Waide of Constructors, Limited, Erdington, has been elected vice-chairman.

Miss Valerie M. Theado has been appointed office manager for Brakeshoe International, S.A., Geneva, the newly-formed subsidiary of American Brake Shoe Company. Miss Theado has had 11 years' experience in the export department of Denison Engineering Division, of American Brake Shoe Company, at Columbus, Ohio, the products of which firm will be distributed in Europe through Brakeshoe International.

Mr. A. J. Young, general manager of the English Electric Valve Company, Limited, has been elected to the board and appointed managing director. Mr. F. N. Sutherland has been elected to the board. Mr. R. E. Burnett, general manager of Marconi Instruments, Limited, has been elected to the board and appointed managing director of that company. Both companies are subsidiaries of the English Electric Company, Limited.

Mr. H. J. Graves has been appointed managing director of the British Motor Corporation (Australia) Pty. Mr. Graves, director of the Austin Motor Company, Limited, England, became joint managing director of BMC (Australia) together with Mr. George Lloyd last January. Mr. Lloyd will relinquish his position as joint managing director in the New Year, but will remain a director and will also act in a consultative capacity. Mr. Norman W. Lawrance has been appointed commercial director and Mr. R. L. Abbott, director of manufacturing. Mr. Harold Sainsbury and Mr. Lindsay Shimmin have been appointed associate directors.

Electrical Aids in Industry *Data Sheet* **No. 9**

Lighting-3

Data Sheet No. 7 dealt with some actual applications of factory lighting. Further applications are given here.

Drawing Offices

It is fair to say that in no part of a factory is good lighting more important than in the drawing office. The draughtsman's task is extremely exacting and unless the illumination is up to required standards, mistakes, loss of time and greater fatigue will result.

The essential requirements are :
High value of illumination
(*minimum of 30 foot-candles on the boards*)
Absence of shadows
Absence of reflections

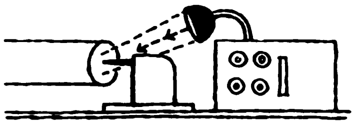
One of the major problems is the reflection of the light sources by shiny tracing paper, instruments, set-squares, etc., and particularly by the extra-hard pencil leads often used. Another problem is that caused by the shadows ahead of T-squares and by the variety of angles at which drawing boards are set.

Fluorescent lighting is particularly suitable because of its comparative freedom from shadow, its natural colour and because it can be localised with respect to drawing boards to avoid reflections while at the same time giving enough light upward and sideways to satisfy the general lighting requirements of the office.

A lighting solution which has been successfully employed for tracing is to light from beneath and through the paper which is fixed on to a translucent panel, thus eliminating the problems of shadow and reflection.

Machine Shops

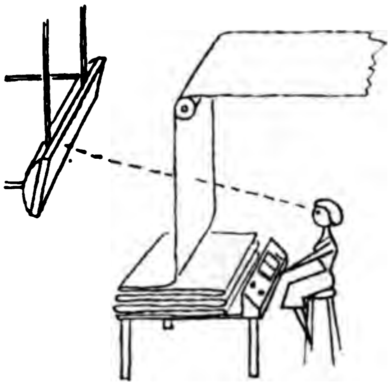
The problems of machine-shop lighting vary so widely that it is impossible to lay down rigid rules which are applicable to all types of machine. Certain maxims, however, have proved in practice to be satisfactory in various trades.



There is a strong case for the provision of local lighting on many machines to enable the direction of light to be varied to suit the work, or to boost the illumination for fine work.

In shops employing certain machine tools, particularly circular saws, the possibility of stroboscopic effects can be avoided by splitting lamps among the phases of a three-phase supply or by using twin lamp fittings with a split-phase circuit.

Where safety goggles are used, extra illumination should be provided to compensate for the reduced light reaching the eyes.



Silhouette inspection of fabrics or profiles can often be used to advantage by placing a light source behind the material to be inspected.

In general, machine-shop lighting is essentially an empirical science, based largely on a combination of general and local lighting, which offers immense scope for ingenuity.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on electricity and productivity (8/6 each or 9/- post free) are available—"Lighting in Industry" is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity, including one on industrial lighting. Ask for a catalogue.

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CUT HERE

Pig-iron and Steel Production

Statistical Summary of September Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in September. Table 3, weekly average production of finished steel in August. Table 4 gives the production of pig-iron and ferro-alloys in September, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100			Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials.						Imports.[1]	Prod. ingots, castings.	Delivs. finished steel.	Stocks.[2]
1957	328	488	537	325	303	270	275	220	14	417	322	1,444
1958	343	503	478	276	262	227	245	196	9	369	284	1,542
1959—June[3]	338	487	475	285	232	204	235	214	9	388	292	1,425
July ..	338	486	472	275	226	201	222	169	7	320	245	1,436
Aug. ..	338	486	479	264	212	193	220	172	5	337	241	1,496
Sept.	338	486	480	288	259	212	251	231	7	426	—	1,463

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in September, 1959.*

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derbys, Leics, Notts, Northants, and Essex ..	—	4.6	15.0 (basic)	2.5	0.1	20.7	1.5	22.2
Lancs. (excl. N.W. Coast), Denbighs., Flints. and Ches .. .. Yorks. (excl. N.E. Coast and Sheffield)	0.8	36.9	—	4.9	0.3	41.5	1.4	42.9
Lincs.	—	47.7	—	—	0.1	47.7	0.1	47.8
North-East Coast	0.7	77.5	—	1.3	0.3	78.1	1.7	79.8
Scotland	1.4	40.0	—	2.5	—	42.2	1.7	43.9
Staffs., Shrops., Worcs. and Warwicks.	—	20.7	—	4.0	0.8	23.8	1.7	25.5
S. Wales and Monmouthshire	2.1	88.0	9.1 (basic)	0.9	0.1	99.8	0.4	100.2
Sheffield (incl. small tonnage in Manchester) ..	8.9	35.1	—	13.6	0.3	56.2	1.7	57.9
North-West Coast	0.1	—	5.4 (acid)	0.6	0.1	6.1	0.1	6.2
Total	14.0	350.5	29.5	30.3	2.1	416.1	10.3	426.4
August, 1959	6.9	284.9	24.1	19.6	1.6	329.4	7.7	337.1
September, 1958	17.5	306.5	21.2	21.1	2.3	358.1	10.5	368.6

TABLE 3.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1956.	1957.	1958.	1959.	
			August.	July.	August.
Non-alloy steel:					
Ingots, blooms, billets, and slabs[4]	4.7	5.0	3.1	4.2	4.7
Heavy rails ..	9.7	11.2	6.8	5.7	4.0
Sleepers	1.1	1.3	0.3	0.1	0.4
Fish and soleplates	0.7	0.8	0.5	0.5	0.2
Plates:					
(i) Over ⅜ in. thick ..	30.3	34.0	27.6	16.0	21.6
(ii) Under ⅜ in.	19.9	20.3	15.2	16.2	17.7
Other heavy prod.	50.3	53.0	29.5	28.5	37.7
Ferro-concrete bars	7.8	8.9	6.0	10.5	8.6
Wire rods	22.9	23.3	16.8	17.8	18.4
Arches, etc. ..	10.1	11.0	7.2	5.7	7.0
Other light sections	41.4	38.7	21.4	26.6	25.9
Bright steel bars ..	8.0	7.0	4.5	6.6	6.4
Hot-rolled strip ..	24.5	23.1	16.5	23.3	19.5
Cold-rolled strip ..	7.5	7.1	4.8	7.1	6.2
Sheets incl. coated:					
(i) Hot rolled ..	15.0	13.0	8.6	11.2	10.7
(ii) Cold reduced	24.8	29.1	32.1	29.0	32.4
Tinplate:	31.8	18.8	12.9	23.8	11.1
Blackplate ..	1.3	1.0	0.5	0.9	0.3
Tubes up to 16 in.	26.2	22.1	15.4	19.0	16.7
Tube and pipe fittings	0.5	0.5	0.3	0.3	0.3
Tyres, wheels, axles	4.6	5.1	3.2	1.5	1.3
Forgings (excl. drop)	3.0	3.1	2.2	1.9	1.7
Steel castings ..	4.5	4.6	3.1	3.0	2.9
Tool and magnet steel	0.3	0.3	0.2	0.2	0.2
Total	335.0	342.3	238.7	259.6	255.9
Alloy steel	17.3	17.8	11.2	15.1	14.5
Total deliveries from UK production[5] ..	352.3	360.1	249.9	274.7	270.4
Add: Imported finished steel ..	19.5	9.6	5.0	8.0	5.9
	371.8	369.7	254.9	282.7	276.3
Deduct: Intra-industry conversion[6] ..	55.2	48.2	28.6	38.5	36.5
New material ..	316.6	321.5	226.3	244.2	239.8

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total
Derbys. Leices, Notts, Northants, and Essex	17	—	20.8	20.0	1.3	—	42.1
Lancs (excl. N.W. Coast), Denbighs, Flints, and Ches. .. Yorks (excl. N.E. Coast and Sheffield)	5	—	21.0	—	—	1.2	22.2
Lincs	8	—	40.5	—	—	—	40.5
North-East Coast	16	1.6	49.3	—	—	0.7	51.6
Scotland ..	5	0.5	15.2	0.6	—	—	16.3
Staffs, Shrops, Worcs, and Warwicks ..	4	—	6.8	0.9	—	—	7.7
S. Wales and Monmouthshire	11	1.7	47.1	1.1	—	—	49.9
Sheffield	2	—	3.5	—	—	—	3.5
North-West Coast	7	16.5	—	—	—	0.8	17.3
Total ..	75	20.3	204.2	22.6	1.3	2.7	251.1
August, 1959 ..	74	15.6	179.8	20.5	0.7	3.0	219.6
September, 1958	84	23.7	186.1	18.8	0.2	2.1	230.9

---

[1] Weekly average of calendar month.

[2] Stocks, mainly ingots and semi-finished, at the end of the and months shown.

[3] Five weeks, all tables.

[4] Other than for conversion into any other form of steel listed.

[5] Includes finished steel produced in the UK from imported and semi-finished steel.

[6] Material for conversion into other products also listed in this

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AP91

Raw Material Markets

Iron and Steel

Substantial demands for high-duty castings continue to be received by the engineering and speciality foundries. They provide sufficient work to enable most of the plants to obtain a satisfactory level of production. The motor vehicle trade continues to call for particularly large tonnages of castings. There is no sign of any reduction in demands from this trade and the orders at present on the books will keep the foundries fully occupied for many weeks. The engineering foundries supplying castings to many other trades, including heavy engineering, power and electrical plant manufacturers, agricultural implement makers, steelworks, etc., are receiving a good level of business, and those supplying to the machine-tool trade maintain improved outputs. From collieries and railways, however, demands for castings are no more than moderate.

The light-casting trade as a whole is working below capacity, although those works connected with the domestic utensil and the building trades are fairly well employed. Most of the jobbing foundries are obtaining steady outputs, but the textile foundries are only moderately employed.

Demands for pig-iron are concentrated mainly on the low-phosphorus irons. Another furnace in the Derbyshire area will shortly be producing this grade of iron, and this additional source of supply will be welcomed. Although in recent months additional brands of low-phosphorus irons have become available, some producers have been compelled to restrict sales to their regular customers by allocation. Consequently, heavier demands are being made on other suppliers. Demands for hematite and refined irons from these foundries have also increased. Deliveries of both these grades are coming forward satisfactorily. The call for high-phosphorus pig-iron is steady, and the light, jobbing, and some of the engineering foundries are able to obtain the required supplies without difficulty. Furnaces continue to export consignments.

There is a strong demand for arisings of good quality cast iron and steel scrap. Foundry coke deliveries continue to be satisfactory, while all orders for ganister, limestone, and firebricks are readily covered.

The re-rollers are very busy and most of them are obtaining substantial outputs from a full working week. There is a brisk demand for small bars and light secsections, while the call for reinforcing rods is maintained at a high level. The demand for steel semis is also maintained, and present requirements of steel billets, blooms, and slabs exceed the current outputs of the steelworks.

Non-ferrous Metals

The US copper position is changing slowly. The producers, following the lead of Kennecott, have raised their price 1½ cents to 33 cents a pound. This could, conceivably, be a prelude to Kennecott's agreement with the Mine-Mill Union with whom negotiations have been proceeding for some time and out of which it is believed that some provisional agreement has been reached. However, negotiations with the union and the other large US producers, such as Anaconda and Phelps-Dodge, are still considered to be only intermittent. All that being so, and the fact that the present strike, together with the Chilean dispute, has resulted in an estimated loss of production of around 250,000 tons, it is obvious that a critical shortage of *metal in the* US must be a reality sooner rather than *later.*

The general view in the US appears to be
critical time will come early in the New Year
be accompanied by a rise in the price levels. '
extent this opinion assumes either a settlemer
strike in the next few days or is based on the
of working up production figures in a short ti
the resumption of mining. In the short run, tl
it will not matter too much whether the stee
walk out again on January 26. However, it wi
whether the longshoremen reach a settlemen
the end of this month, which would see th
the 80-day "cooling-off" period.

The London market is still sensitive, but t
of prices is very definitely upwards. Yet, run
ad hoc settlements in the States concerning the
copper strike unsettle the market immediatel
is somewhat of a pity as, although the prese
level has outrun demand, the market is resti
fairly firm basis. Stocks continue to fall an
end of last week the amount of metal held
official warehouses was down to 5,897 ton
feature of the market is the pressure on ca
and the shortage thereof is reflected in the ba
tion of around £15 over three months' metal.

Lead continues featureless, although the d
of offerings from the Continent has had a s
effect. In the US demand is patchy and the
changed at 13 cents a pound. Zinc in London c
steady and, with consumer interest concentr
prompt metal, the backwardation has gone
over £5 a ton over three months' metal. In
demand is satisfactory and, if an overall settle
the steel strike can be achieved before the
expiry date of the 80-day "cooling-off" peri
outlook is reasonably bright. Meanwhile, tl
Louis spot price is unchanged at 12½ cents a p

Tin has been a quiet market, waiting for cc
reaction towards raising of the tin quota for
quarter of 1960 by 6,000 tons to 36,000 tons
additional tonnage allowed exporters, represent
than 95 per cent. of the producers' capacity,
more than was generally thought would be a
In London there is a definite resistance towa
price going too low. Singapore is experiencin
activity, but US demand is disappointing.
thought and believed that the ending of th
strike would mean a resumption of demand fr
tinplate industry, but this has not as yet mater
Tin stocks in London at the end of last wee
lower by 208 tons at 7,977 tons. The US price
only fractionally above 99 cents a pound.

Obituary

Mr. RICHARD HENRY DAYBELL, formerly chief
of G. R. Turner, Limited, engineers and wagon bu
of Langley Mill, Notts, has died at the age of 7
had been associated with the firm for more th
years, before his retirement in 1957.

Mr. JAMES L. CHALMERS, chairman and ma
director of E. Chalmers & Company, Limited,
merchants, Edinburgh, has died at the age of 69
had been president of the National Associati
Non-Ferrous Scrap Metal Merchants and of the
tish Scrap Iron & Steel & Metals Association.

Mr. J. E. FISH, senior director of James Ma
Company, Limited, ironfounders and engineers,
wood Foundry, Nottingham Road, Mansfield, ha
at the age of 82. Mr. Fish spent 68 years a
Sherwood Foundry, and was actively associated
the business until he was taken ill a few weeks

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Current Prices of Iron, Steel, and Non-ferrous Me

(Delivered unless otherwise stated)

December 9, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron). Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent, C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C,
£38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per
£39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship
(N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E.
£44 12s. 0d.; floor plates (N.-E. Coast), £43 1
angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E.
£39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, und
and flats 5 in. wide and under, untested soft basic,
and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 1
under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip
100 tons and over, £38 0s. 0d.; uncoated strip mill c
rolled, under 3 mm. to 12g., 25 tons to under
£43 16s. 0d.; black sheets (hand mill), 24g., 10 tons a
£57 14s. 6d.; galvanized corrugated sheets, 24g., 10 t
over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 1
nickel-chrome, £99 4s. 0d.; nickel-chrome-molyb
£111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £258 10s. 0d. to £259 0s. 0d.;
months, £242 0s. 0d. to £242 10s. 0d.; sett
£259 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 4½d. p
rods, 268s. 0d. per cwt. basis; 20 s.w.g., 303s. 0d. p

Tin.—Cash, £792 10s. 0d. to £793 10s. 0d.; three m
£789 10s. 0d. to £790 0s. 0d.; settlement, £793 10s. 0

Lead (Refined Pig).—First half December, £71 10
to £71 12s. 6d.; first half March, £71 15s. 0
£71 17s. 6d.

Zinc.—First half December, £96 0s. 0d. to £96 2
first half March, £90 5s. 0d. to £90 7s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all
destinations, £130 0s. 0d.; rolled zinc (boiler plate
English destinations, £127 15s. 0d.; zinc oxide (Red
d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0d. p
sheets to 10 w.g., 216s. 3d. per cwt.; wire, 2s. 9½d.;
metal, 216s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £165; B6, £217.

Brass (High Tensile).—BS1400, HTB1, £199;
£215; HTB3, £229.

Gunmetal.—BS1400, LG2, £206; LG3, £215; G1,
£271; G1, 1%, £257.

Phosphor Bronze.—BS1400, PB1 (AID released),
BS1400, 90/10/1, £282.

Leaded Phosphor Bronze.—BS1400, LPB1, £228.

Phosphor Bronze Strip, etc.—Strip, 306s. 9d. per
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Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d.
Antimony, English, 99 per cent., £190 0s. 0d.
ex-warehouse, £71 10s. 0d. to £72 0s. 0d. Nickel,
Aluminium, ingots, £180 0s. 0d.; aluminium bronze (
AB1, £252; AB2, £260.

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* *Average 68–70 per cent.*

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V. C. Faulkner, F.R.S.A., Hon.M.I.B.F.

Assistant Editor:
A. R. Parkes, M.I.B.F.

Commercial Editor:
P. E. Carden.

Advertising Manager:
F. Barrington Hooper, B.A.

Production Manager:
R. J. Lovell

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H. J. Dwyer

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E. T. Griffiths

District Representatives:
G. P. Elliott
(Northern Area)
'phone:
Altrincham 1334

T. H. Smith
(Scotland)
'phone:
Dumbarton 1046

D. C. Ryall
(Southern Area)
'phone: TRAfalgar 6171

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CHRISTMAS 1959

Season's Greetings

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FOUNDRY
TRADE JOURNAL

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Accident Prevention

Periodically, there are launched such laudable activities as " Safety-first Weeks." For these events, quite often shock-tactics are resorted to by the issue of various types of posters featuring people who are lame or blind as a result of an industrial accident. It would be almost a coincidence if, as a result of the showing of a poster, the specific type of accident covered by it was prevented. The major beneficial influence in the general campaign against accidents has been a long series of Factory Acts and the thinking they have generated in industrial circles. High ranking amongst these is the insistence on good-housekeeping principles, as in the grand total of accidents it is not those which " hit the headlines " in the local newspapers that numerically are serious, but the daily ones caused through slipping, being hit by something falling from a height, or just bumping into an unnoticed projection.

Thus, it is the permanent system of law which has done most for the reduction of painful and expensive industrial accidents, and this fact has apparently inspired American foundrymen through the Gray Iron Founders' Society—one of their employers' federations—to take the matter a step further. Thus, their safety committee has issued a simplified " safety check list " for use by management when making periodic inspections. The check list also includes provision for rating safety performance, as well as space for noting discrepancies, comments or rectifications.

What appeals to us is that a committee of practical men should have put their combined experience at the disposal of their colleagues in the industry in a form where it could do most good. Just as the attitude " familiarity breeds contempt " is a cause of accidents, so, too, the repeated periodical inspection of a shop, even though accident prevention is uppermost in the mind, induces a sort of mental myopia. A bad divergence from good practice can easily make an inspector forget to look out for minor faults. The actual filling up of forms and putting an OK to a question as to whether the gangways are clear does perhaps make one take a second look. We are unfamiliar with the make up of this safety check list which lack, no doubt, our American friends will remedy, but we are convinced it is a logical and worthwhile step towards reducing accidents.

Presentation Nowadays Almost Unique

An unusual ceremony took place recently at the works of Osborn Foundry & Engineering Company, Limited, Sheffield. This was the presentation made to Mr. R. F. Horton by shop stewards on behalf of all employees in appreciation of the work done by all the company's staff engaged in commercial activities. It was, in addition—so the citation read—a gesture of the company's personal appreciation and regard for Mr. Horton, and an acknowledgment of all he has done, not only in the field of commerce, but in other activities from which all the employees and staff have benefited. The presentation took the form of a stainless-steel hand holding two stainless-steel castings of a fish and a loaf, mounted on a plinth. On the side of the plinth, there is a stainless-steel plate which bears the following inscription:—

> Presentation to R. F. Horton, Esquire, by shop stewards of the Osborn Foundry & Engineering Co., Ltd., on behalf of all employees, in appreciation of his efforts to obtain work and from which all have derived much benefit. In presenting this "Symbol" the employees desire to incorporate into this act of appreciation all the people engaged in similar duties and the Directors of Samuel Osborn & Company Limited who support all this effort.

In making the actual presentation, one of the shop-stewards explained that the "symbol" incorporates the company's trade mark of the "Hand and Heart"; the wings denote travel and the contents of the hand the benefits all receive. This presentation might be considered unique in this modern industrial age, he went on, but it is, in fact, a continuation of similar presentations which were once quite frequent. It is regarded as a "living" token, offered with the greatest sincerity, he concluded.

Mr. R. F. Horton, director of Samuel Osborn & Company, Limited, admiring the symbolic "hand, fishes and loaf" casting in stainless-steel presented to him by fellow employees.

Left to right: Mr. Eric Nicklin; (Mr. R. F. Horton); Mr. William Marsden; Mr. Harold Twigg; Mr. James Taylor and Mr. George Hayward.

New Technology Award

Detailed arrangements for the award of Member of the College of Technologists (MCT) were announced by the National Council for Technological Awards last week. The award follows the Diploma in Technology and is given to those who complete a substantial programme of work of value to industry carried on jointly in industry and a college.

Commenting on the arrangements, Lord Hives, chairman of the Council and of the governors of the College and former chairman of Rolls-Royce, Limited, said the new award provided a qualification in technology equivalent to a PH.D. degree of a university. It carried into the field of research that close relationship between academic work and practical experience which was one of the distinguishing features of the Diploma in Technology.

Lord Hives said it was of special significance to-day when Britain must have designers and manufacturers of the highest calibre to increase living standards at home and to play her full part in the progress of the less-developed countries of the Commonwealth.

Research in Machine-tool Industry

An undertaking to give further consideration to the type of research organization most suitable to the industry has been given by the Machine Tool Trades Association. This was announced after a meeting on December 9 of the Department of Scientific and Industrial Research with MTTA representatives. The Association also agreed that much closer co-operation was necessary between engineers and designers in industry, on the one hand, and the research work of universities, colleges, and research institutions on the other.

Further meetings between the MTTA and the DSIR are to be held to discuss specific aspects of research, education, and design. They are the outcome of the recent DSIR survey of the machine-tool industry's research and education facilities.

THE LONDON OFFICE of W. H. Dorman & Company, Limited, and W. G. Bagnall, Limited, locomotive builders and railway engineers, of Stafford, is now at 1, Hay Hill, W.1 (telephone: HYDe Park 1778/9). London sales manager is Mr. R. A. Wenham.

adrid Congress Papers

rt Synopses of the World's Principal
tributions to International Foundry Technology

A survey of the 32 papers presented at Madrid, reveals that thirteen deal with ironfounding, six with non-ferrous founding, five with steelfounding, three with moulds and moulding materials, and five with general subjects. It is interesting to note that major emphasis is still maintained on the iron side, with spheroidal-graphite material. In the papers on steel, casting defects are considered to the virtual exclusion of other subjects. The papers summarized in this issue are those printed in English (eleven), and Spanish (five). The concluding section, which will follow next week, will contain the seven papers presented in French, and the nine papers given in German (the other official languages of the Congress). The Congress was reported in the November 12 JOURNAL.

inted in what follows are summaries of the rs presented at the various technical sessions ıe 26th International Foundry Congress, held adrid last October. For the sake of conveni- the summaries of papers in English are quoted followed by those in the other three official ıages—Spanish, French and German. (In each the language of the paper is indicated.) All ıapers have been assembled into one loose-leaf ne, and readers interested in acquiring a set* ld write to the Congress Secretary, José Andrés, *'uto del Hierro y del Acero, Ciudad Universi-* Madrid.

Grain Structure in Sand Castings

)r. V. Kondic, B.Sc. (*British Exchange Paper*)

ıe term "cast structure" is defined in terms of o- and micro-phenomena normally encountered oys in the cast state. The concept of the grain ·ystal is then singled out as one of the key res of the cast structure, and the theoretical lems connected with the explanation of the ı of grains are discussed. The concepts of :ation and crystal growth as the basic elements ıe theory of the origin of cast structure are outlined, and examples of the practical applica-)f this theory in foundry practice are given. The rtance of grain structure in controlling casting :rties for two typical groups of alloys, *viz* ·solution type and eutectics, is then discussed. point is made that, apart from the grain size, ze, shape and distribution of other constituents n grains also have to be considered.

ıinium Eutectics

me recent work on the problem of explaining in structural changes observed in commercially- aluminium and aluminium-silicon eutectic is reported on. Fine grain structure, observed ›mmercially-pure aluminium poured at tem- ures near the melting point, was found to be to turbulence. The very fine or modified tures obtained with aluminium-silicon eutectic, r by rapid cooling or by small additions of sodium, were found to be formed by essentially the same process, as far as the basic origin of these structures is concerned.

In the discussion on the paper, two general points were made: first, that the present state of the theories of nucleation and crystal growth is inadequate to deal with many problems encountered with cast structure in foundry practice, and second, that the problem of the influence of grain structure on the properties of castings is still largely undetermined.

Production of Castings in Tin-Bronze

By Masataka Sugiyama (*Japanese Exchange Paper*)

Gross shrinkage defects seldom occur in tin-bronze castings if melting is carried out carefully. This seems to be due to the fact that shrinkage cavities in bronze castings are nearly always so microscopically fine and dispersed that they are not noticeable. The author's object was to investigate these shrinkage defects, and determine the effect of riser and end portions of castings on soundness of tin-bronze castings. Castings were produced under various conditions, and X-ray inspection carried out using the thin slices cut from each specimen. The occurrence of porosity in the castings, the effect of risers, and the cooling action of end portions of the castings was studied. Similar experiments were carried out with brass and aluminium-bronze castings, for purposes of comparison.

Results

The following results were obtained. In tin-bronze, feeding of metal during solidification is difficult, because of its long freezing-temperature range, and fine shrinkage porosity is inevitable. Shrinkage defects are varied by the mode of crystalline growth, and the growth of equiaxials is accompanied by dispersed microporosity. Columnar crystals cause centreline shrinkage cavities. Feeders have little effect upon the soundness of castings so far as shrinkage cavities are concerned. In columnar-crystal structured castings, shrinkage cavities are concentrated into the centreline portion. The sound end zone is influenced by pouring procedure, horizontal pouring being more effective than

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ıce available on application.

vertical pouring. With vertical pouring, a top gate is more desirable than a bottom gate, and pouring should be done slowly.

Oxidation of Niobium

By Tor Hurlen (Norwegian Exchange Paper)

By means of semi-continuous gravimetric and volumetric measurements, the rate of reaction of niobium with oxygen as a function of time has been determined at temperatures of 150, 200, 250, 300, 350, 375, 400, 425, 450, 500, 550, 600, 650, 700, 750, 800, 900 and 1,000 deg. C., and, for most of the temperatures, at oxygen pressures of 760, 100, 10, 1, 10^{-1} and 10^{-2} mm. of Hg. This research work was followed by investigations of oxidized specimens by means of X-ray diffraction, electron diffraction, electron microscopy and metallographic techniques. Some continuous X-ray-diffraction measurements directly on specimens undergoing oxidation have also been made. Niobium has been found to react with oxygen in a rather complex and unusual way, but a close correlation seems to exist between the oxidation-rate curves and the oxidation products formed.

A discussion is presented on this matter which includes the effects of temperature, oxygen pressure, and time on the oxidation behaviour of niobium. Oxidation is already appreciable at temperatures of 200 to 250 deg. C. The dissolution of oxygen into the niobium metal lattice plays an essential role during the initial stages of oxidation. Two different suboxides (NbO_x and NbO_y) have been detected among the oxidation products, in addition to the more well-known oxides of niobium (NbO, NbO_2 and Nb_2O_5). Oxide whiskers appear on top of the oxide scale on sheets oxidized at 800 to 1,000 deg. C. This work has been sponsored by the Wright Air Development Centre of the Air Research and Development Command, United States Air Force, through its European office.

Internal Tearing in Steel Castings

By Isaac Minkoff (Institute of Technology, Haifa), Charles W. Briggs (Steel Founders' Society of America) and Howard F. Taylor (Institute of Technology, Massachusetts) (Israeli Exchange Paper)

Stresses acting in the cross-sections of cast-steel components have been shown to play an important part in determining tearing behaviour, particularly in the presence of shrinkage cavities. This has been investigated for castings of square and rectangular section, and also in the case of rings and cylinders.

For rings joined to cylinders, tearing is determined by whichever stress system predominates, that acting in the ring, or that acting in the cylinder—this has been initially investigated, and may play a significant part in overall tearing behaviour. It has been considered in relation to *bore cracking* of steel castings and the results *corroborated* and added to previous findings by Taylor *et al*[*]. The influence of inadequate feeding, and ensuing shrinkage, on the severity of bore cracking has been demonstrated.

The present investigation has not attempted to investigate the influence of core strength on tearing behaviour. When considering the tearing of steel castings, all contributory stress systems must be considered. The observations presented in this paper are intended rather to draw attention to stress systems due to temperature distribution in the cross-section of castings, and their intensification with insufficient feeding.

Ferro-alloys and Inoculants for High-strength Grey Cast-iron

By Howard H. Wilder (American Exchange Paper)

The introduction to this paper consists of a historical background to the field of grey-iron foundry operations. A description of the products and chemistry involved is given, and microstructures encountered are reviewed. Typical examples of American inoculation practice for production of 13.4, 15.6 and 20.0-tons per sq. in. tensile-strength irons are given, with chemical analyses and metal-charge mixtures. The production of high-strength grey cast-irons, by using inoculants and alloying materials for 13.3 and 17.8-tons per sq. in. tensile irons, is also presented. Conditions under which graphitizing and stabilizing-type inoculants can be used are indicated, and sizes of addition agents and precautions necessary for good practice are detailed. Alloys for achievement of specific results are summarized in a table for ready reference.

Typical high-tensile-strength grey cast-irons that are representative of American operations are shown, with their strengths before and after additions are made. The effects of minor elements present in inoculants, and the part they play, are outlined by the author. Future considerations of materials, and research work needed, are also commented upon.

Ageing of Aluminium/Magnesium Casting Alloys

By L. J. G. Van Ewijk (Holland)

Earlier papers by the author on the subject of ageing of aluminium-magnesium casting alloys have dealt with:

The influence of various heat-treatments on alloy properties.

Room-temperature properties after heating to elevated temperatures for various periods.

Change of properties at ageing temperatures greater than 100 deg. C.

Change of properties at ageing temperatures after exposure to these temperatures for various lengths of time. Also, a general survey of the structure of these alloys before and after these ageing tests was previously given.

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[*] See Transactions, American Foundrymen's Society, 54, 670.

this paper, a more extensive study of the ıral changes occurring in these casting alloys cribed, and from these data tentative con- ıs are drawn. The samples for these investi- s were taken from (*a*) test castings that had for the three previous papers mentioned, ·) from additional castings specially produced e tests described in the present Paper.

enetration of Low-melting-point Metals into Foundry Sand

y K. Fursund (*Danish Exchange Paper*)

investigation of penetration phenomena in :tion with iron is comparatively difficult, as :s take place in the sand during penetration. :als having a low melting point, the degree of ation should be determined by physical and ıl conditions only. This investigation deals exclusively with low-melting-point metals, ;eems that physical conditions must also be ninant during penetration of iron.

experiments were arranged so that penetra- to the sand could be observed through a glass vhile it was happening. This experimental d has furnished particulars of the penetration nism which otherwise could only have been ed with considerable difficulty. Metal pene- ı takes place under conditions of disequili- the movements occurring in jumps. For ıre metals and eutectic alloys these jumps ·lace as soon as the metal surface is molten. ıolten metal, even at melting point, can pene- omewhat into sand, even though the sand is erably colder than the metal.

Hot-tearing in Steel Castings

Kurt Beckius, Merton C. Flemings, and *ıard F. Taylor* (*Swedish Exchange Paper*)

imple method was developed of testing the ıce of variables on the susceptibility of steel ;s to hot-tearing. A test casting which could ulded in a standard flask was used, suscepti- .o hot-tearing being measured without special nentation. Variables tested were sand h, chemical composition of the steel, and g temperature. Observations were made on external and internal hot-tearing. Design :s made included variations of fillet radii and of constraining member, and the use of ts. The results of this investigation helped ·lain (1) the relationship between feeding, ; design and external hot-tearing, and (2) the ion of internal hot-tears in steel castings. oncluded that both internal tears, and open ıl tears, can be eliminated by the provision quate feeding.

st-furnace Pig-irons for Nodular-graphite Cast-iron

By Isao Aoki (*Japan*)

rons for nodular cast-iron have been pro- since 1953 in the blast-furnace of the Kamaishi Iron Works. Sometimes, in the past, these irons were found to be unsuitable, although their chemical analyses were within specification. In an investigation carried out by the author the following results were obtained: The special elements such as Sn, As, Sb and Pb, etc., which entered the pig-iron from the ore used, were found to have a deleterious effect on the formation of nodular graphite. This effect was emphasized by the 0.05- to 0.1-per cent. titanium which was always present in the pig-iron. It was found possible to produce much better pig-iron by using raw materials which contained harmless amounts of the above elements.

Manufacture of High-duty Iron

By N. G. Chakrabarti (*Indian Exchange Paper*)

There are about 1,800 grey-iron foundries in India, producing agricultural implements, cast-iron pipes, flanges, fittings and castings for general engineering purposes. With the growth of the automobile industry there, manufacture of cylinder blocks, brake drums, clutch housings, etc., has become a necessity. This work cannot be undertaken by ordinary foundries, since the metal employed is of the high-duty type, having not only high tensile strength but also good wear-resisting properties. The term "high-duty" cast-iron is usually employed to indicate grey cast-irons that have a tensile strength greater than 17.9 tons per sq. in. These irons are costlier to produce than ordinary iron, the strength of which is generally within the range of 9.0 to 15.6 tons per sq. in.

Filming the Flow of Metals in Shell Moulds, using an Image Intensifier

By K. Shobayashi and K. Okamoto (*Japan*)

To obtain good castings it is important to understand how molten metals flow in the mould. Much research has been done on this subject, some investigators having endeavoured to simulate the flow of metals by observing the movement of waxes and mercury in transparent moulds. The authors of this paper have successfully filmed the continuous flow of metals in moulds by using an X-ray image intensifier originally manufactured for medical studies by the X-ray department of their laboratory. After many experiments to find a suitable film and camera for the fluorescent image, 8-mm. and 16-mm. films of the flow of metals and occurrence of blowholes and slag inclusions were taken.

Nodular Cast-irons inoculated with Cu/Si/Mg Alloys

By F. Rodriguez Yufera and J. Orland, S.J. (*Spain*) [*In Spanish*]

A series of tests on castings inoculated with copper-magnesium alloys showed that the mechanical characteristics of the material are very homogeneous, the tensile failure loads being kept between

25.4 and 31.7 tons per sq. in. in the as-cast condition, or with heat-treatment (in which case elongations of from 5 to 10 per cent. are obtained). The fatigue limit by rotatory transverse, and the Young's modulus, are very high, especially the latter, the value of which is comparable to that of steel, showing that the material has good elastic qualities which make it suitable for the construction of machines, in spite of the fact that resilience tests may have given comparatively low figures. This has no marked significance in determining a material, in view of the measurement errors in the determination of the energy which are subject to the test-piece conditions (dimensions, macrostructures), as the dynamic characteristics are a function of the elastic properties. With special treatments the material can be improved, so that it can withstand the greatest dynamic stresses.

Conclusions

A description is given of the tests, and it is concluded that copper, which is much cheaper than nickel, can replace the latter, which is in very short supply in Spain. It is also decided that copper alloyed with magnesium and silicon can be used for producing spheroidal-graphite castings of excellent mechanical and structural properties, and, even though its characteristics are not generally so high as those of nickel, they are, however, of a sufficiently high level to make the alloy quite suitable for normal industrial applications.

The Friction Angle in "Green" Moulding-sands, and its relationship to Technological Properties and Hydration of Clays

By J. Navarro Alcacer (Spanish Exchange Paper) [*in Spanish*]

In this work the term "internal friction angle" derived from Mohr's circle theory has been introduced, for a study of moulding sands. It is suggested that this can numerically account for the so-called "flowability" of moulding sands. A short review is given of some proposed methods for measuring "flowability," and theories on the hydration process and bonding effect of clays are also discussed. The measurement of the angles of internal friction for the materials tested is next considered, and some usual figures for these angles, taken from literature on the Science of Soils, are given.

Index of Flowability

As an index of flowability, the number ψ, inverse of the friction angle, has been adopted, and the relationships between strength (σc) and flowability number ψ investigated for several sand-clay-water mixtures. For increasing amounts of water a point (45 to 65 per cent. H_2O) is reached where strength decreases and the value ψ seems to increase, as if announcing the appearance of the lower *limit of plasticity* (—100 per cent. H_2O). The *variation* of permeability in terms of changing flowability has also been studied, and these results are interpreted on the basis of the hydration theory of clays.

Influence of Feeder-heads on Costs of Castings

By Dionisio Escorsa Civis (Spain) [*in Spanish*]

The influence of size of sprue and riser on the cost of metal in a finished casting has been studied. It seems evident that the cost of metal of castings having the same weight will be higher in the ones requiring a heavier gating. If the costs for these different percentages are calculated, and likewise the ratio between the weights of the parts concerned and their gates, a chart can be made which will serve to determine directly the cost of the metal, with no further calculation, of any casting if its weight and that of one of its gates are known (provided the prices of materials and labour remain unchanged). The curve in this chart enables one to calculate quickly the cost of the metal in a casting which has to be repeated one or more times. The cost of the metal in the ladle can also be easily determined, as it is simply the cost of the casting without gates.

Improving the Modulus of Elasticity in Cast-irons

By Alberto Solé Amat (Spain) [*in Spanish*]

In this Paper the author emphasizes the importance of knowing the elasticity modulus of a cast iron, since it is a true criterion for estimating the quality of the material. In order to reveal the factors that determine it, several melts were made, some of them with changing diameters, with the aim of observing the influence of the cooling speed, the composition, the addition of inoculants, and other possible elements. In each of the casts and in each of the sections, there was determined, apart from the elastic modulus, the hardness, tensile strength, degree of eutectic saturation, and the chemical composition. The study was completed with a microscopic examination. The results obtained have been duly compared and translated into graphs, in order to clarify the conclusions drawn.

Segregation of the Alpha/Delta Eutectoid in Copper/Tin Alloys

By Francisco Joanxich Ayma (Spain) [*in Spanish*]

In this paper the massive formation of the alpha/delta eutectoid in Cu/Sn alloys cast in sand moulds is studied, and means of overcoming this defect suggested.

PARTICULARS ARE AVAILABLE from the Board of Trade, Export Services Branch, Lacon House, Theobalds Road, London, W.C.1, quoting reference ESB/28993/59, of an enquiry for the supply of Meehanite cast-iron sluice valves of various types for the Central Electricity & Water Administration, P.O. Box No. 1[illegible], Khartoum, Sudan. (Tender No. CEWA/W/21/59.) The closing date for tenders is December 31.

ıpola Instrumentation

Progress Report from the Foundry of Geo. Salter, Limited.

ıe assessment of foundry instrumentation as an
o the solving of production problems, is the basis
"success" story from Geo. Salter Limited of
Bromwich, following the installation (Fig. 1) of a
Thompson cupola meter* Salter's business was
ded in 1760, and their foundry, which had then
in existence for some years, was acquired 75
ago. For the last ten years, modernization of
foundry has taken place in stages, but a major
ing problem remained until a year ago when the
la meter was installed. Serving the dual purpose
ntrolling the combustion draught and recording the
tions in cupola conditions, the meter comprises a
flow-mechanism with control equipment indicating
recording flow and air-pressure at the wind-belt.
result, complete cupola control has been effected,
many of the difficulties which had hampered pro-
ion have been eliminated.

ast restriction at the beginning of a cupola blow,
ting as it did in cold metal
when tapping, in a "hard
" was the most serious brake
utput. By assessing and con-
ing the required rate of air
necessary for any weight of
charge, the new cupola meter
proved that, for efficient melt-
each of the Salter furnaces
be charged to a point 18-in.
w its sill. Thus, four instead
he full five charges must be
when melting starts. When
charged each of the furnaces
es 22 cwt. of metal and in
ıer of them has a hard hole
experienced since the intro-
ion of the instrument.

Other Advantages

As an outcome of information provided by the new system, costs, both direct and indirect, have been drastically cut. Whereas interrupted melting was a commonplace, constant melting has now taken its place so that casting is possible at all times of the working day, and furnace shutdowns are avoided at, say, lunch times and during similar breaks in working hours. A pronounced saving in coke consumption has been recorded and maintenance costs have been reduced, mainly because of the controlled conditions under which the furnaces now operate. By such control, cupola wear has been reduced to a minimum and, consequently, less re-lining is necessary. The output of the Salter foundry—approximately 1,600 tons of machineable grey-iron castings per year—is used in the manufacture of the company's weighing machines and in fulfilling contracts for a wide variety of industries.

1—*Collecting metal at the*
ıla spout at Geo. Salter's
ıdry, West Bromwich; on the
is the control instrument.

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ee JOURNAL, September, 10, 1959.

·on Equipment for Japan

ıree electro-hydraulic windlasses with separate
tans are being manufactured by the engineer-
division of the Telegraph Construction & Mainten-
Company, Limited (Telcon), at its Greenwich
ks. The equipment is being made for installation
6,000-ton tankers being built by the Kawasaki
kyard Company, Limited, Kobe, Japan, for the
-Ocean Shipping Company, Nassau, Bahamas, to
design of G. T. R. Campbell & Company, Montreal.

cause the tankers will be unloading in unusual
litions on the north-west coast of America, stern
llasses and capstans are to be provided as an essen-
part of their equipment. A hydraulic mooring
tan is also provided as a separate unit.

"Steam Weekend" in Birmingham

Working exhibits to be shown at the City Museum and Art Gallery of the Department of Science and Industry at Birmingham during the weekend of January 2 and 3 will include a Massey steam hammer (1873), a Galloway uniflow engine (1924), an Amos compound beam engine (1864), and a Tangye Colonial engine (1890). It is also proposed to run three hot air engines and a gas engine. A Pollitt & Wigzell horizontal compound engine with Corliss valve gear will be run for short periods each day.

The beam pumping engine, made by Boulton & Watt in 1777 for canal pumping at Smethwick and removed to Ocker Hill, Tipton, in 1897 has recently been dismantled, and it is hoped to show a colour film of the dismantling of the engine during the "Steam Weekend."

Equipment and Supplies

Sedimentation Prevention

A problem frequently met in foundry and enamel-shop spraying of coatings, the ingredients of which settle rapidly out of suspension, is the rapid clogging on standing of pipelines carrying the material. Often spraying cannot be resumed without considerable waste of time and spraying material.

Alfred Bullows & Sons, Limited, Long Street, Walsall, claim to have solved this problem by using their "Pogo" pump to feed the material through a standard fluid hose to the spray gun, to which is attached a "Y" piece. From the "Y" piece a second length of hose provides a return flow to the pump and hence to the container of material, which is itself kept agitated by the constant flow and return of material. This very simple arrangement has now been operating for just over 18 months, running day and night, and it is reported possible to pick up the gun and spray material at any time, without any stoppage at all. The equipment operates off the existing air line, using less than three cub. ft. per min. of air at pressures as low as 10 lb per sq in. Another possible application of this new development is in the machine-tool industry where "filling" and finishing of castings is carried out on a large scale, and also where metallic paints are used.

Ultrasonic Thickness Gauge

"Vidigage," an ultrasonic resonance gauge, made by the Branson Instrument, Incorporated, Connecticut, USA, has recently been put to use at the plant of Republic Aviation Corporation, Farmingdale, Long Island, New York State. It is used to check possible core shift in a complex magnesium-alloy canopy casting, which forms part of a newly designed American fighter bomber. Permissible core shift is only ± 0.030 in., to avoid any possibility of excessive or unequal stresses on the aircraft when in service.

The new gauge operates with access to only one casting surface, so that all vital dimensions are easily checked. It is claimed that more accurate measurements are obtained with the gauge than with calipers or other measuring devices.

Principles of Operation

Vidigage operators require very little training, since the probe is merely slid across the outer surface of a casting, the varying wall thicknesses being shown on a direct-reading scale (see Fig. 1). Even intricate sections are easily measured, it is claimed, and the thickness readings are instantaneous and accurate to within 0.1 to 1 per cent., depending on the material being tested. Ultrasonic thickness gauging is based on the fact that the natural frequency of a metal or plastic varies inversely with its thickness. Continuously varying high-frequency vibrations (0.7 to 25 megacycles) are transmitted into the material under test through a transducer. The reflected waves are amplified by the instrument, and resonant frequencies (or harmonics) show up as vertical traces on a cathode-ray screen. A suitably calibrated scale placed in front of the screen permits thicknesses to be read directly.

Safety Belt

Barrow Hepburn & Gate, Limited, Grange Mills, Bermondsey, London, S.E.1, have designed a new lightweight safety belt for use by builders' erectors and maintenance engineers. It is claimed that the belt is easy and comfortable to wear, and that it is very much stronger than the more conventional types at present in use.

A dramatic demonstration of the new belt was carried out recently 250 ft. up on the new Shell building in London, in co-operation with the Cleveland Bridge Construction Company, and Sir Robert McAlpine & Sons, Limited. "Spidermen" from both companies were present.

Lifting Magnet

Rapid Magnetic Machines, Limited, Lombard Street, Birmingham, 12, have introduced a new lifting-magnet—the Liftmaster—on which extensive trials have now been completed in steelworks and foundries over a period of four years. The unit is claimed to have certain definite advantages over the conventional bolted design. It is of welded construction and moisture proof, and offers unusual dependability and a greater pick-up power for the nominal diameter. The peripheral face is completely free from projections. For the time being the magnet will be manufactured in three sizes only, [illegible] 52 [illegible] and [illegible] diameter. The firm's standard circular lifting magnets will continue to be manufactured in a wide range of sizes [illegible]

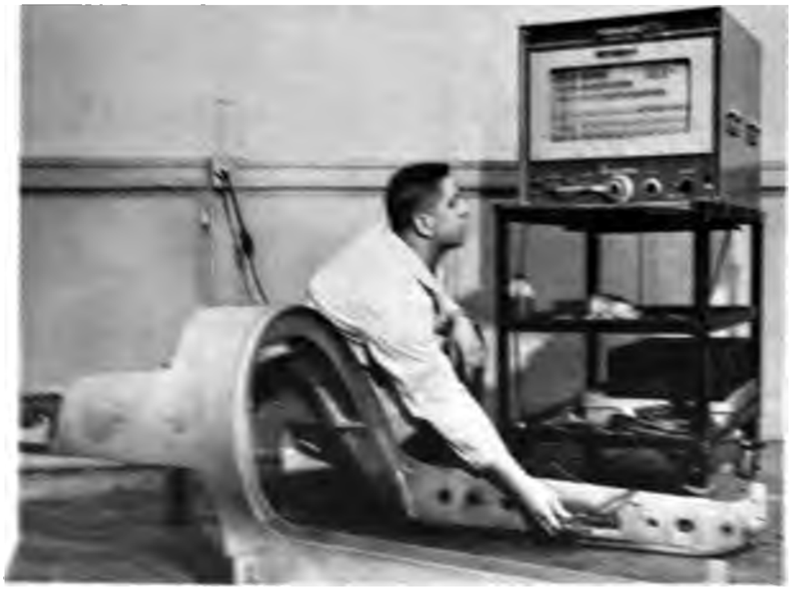

FIG. 1.—Checking [illegible] using the ultrasonic [illegible] Branson Instrument, [illegible] Connecticut, U.S.A. The [illegible] on the right.

Foundry in a Public School

*Plant and Facilities at Oundle, described by Mr. J. France**

Shortly after Mr. F. W. Sanderson was appointed headmaster of the Oundle School, Northants, in 1892, he started the first workshop. Thanks to his lead, and later work, the School is regarded as a pioneer in the teaching of science and engineering. It is interesting to note at the outset that the whole idea of the project was not that of teaching engineering to the students, but of adapting workshop and laboratory practice to general education.

The aims of the first workshop at Oundle School, Northants, were (*a*) to secure a co-operative attitude towards practical work, (*b*) an understanding of the equal value to society of all boys, whether academically talented or not, and (*c*) while not abandoning strict discipline, to encourage boys o put forward their best effort by engaging their natural interests. To-day, with the foundations built up over sixty years, it can be claimed that the facilities at the Oundle School are almost unrivalled by schools of its type anywhere in the world.

Original Foundry Building

The original foundry building—a gift by Mr. P. B. Brown of Hadfields, Limited—was erected by the students in 1921. It was equipped with a Green's emergency cupolette of 18-in. dia., a 50-lb. capacity non-ferrous furnace (made in the School), a sand mill and lever-testing machine (also made in the School) for testing cast-iron bars to destruction, and a sand-permeability testing machine (constructed in collaboration with the School's metallurgical laboratory). The moulding boxes for the foundry, and other essential pieces of equipment, were also made at the School.

At that time, iron castings were produced once a week, and aluminium, brass and gunmetal castings were made as required, usually three or four times per week. The various departments of Oundle School made a constant demand for the products of the foundry and this was supplemented by the requirements of local builders, garages and farmers.

By 1950, it was evident that the old foundry had become too

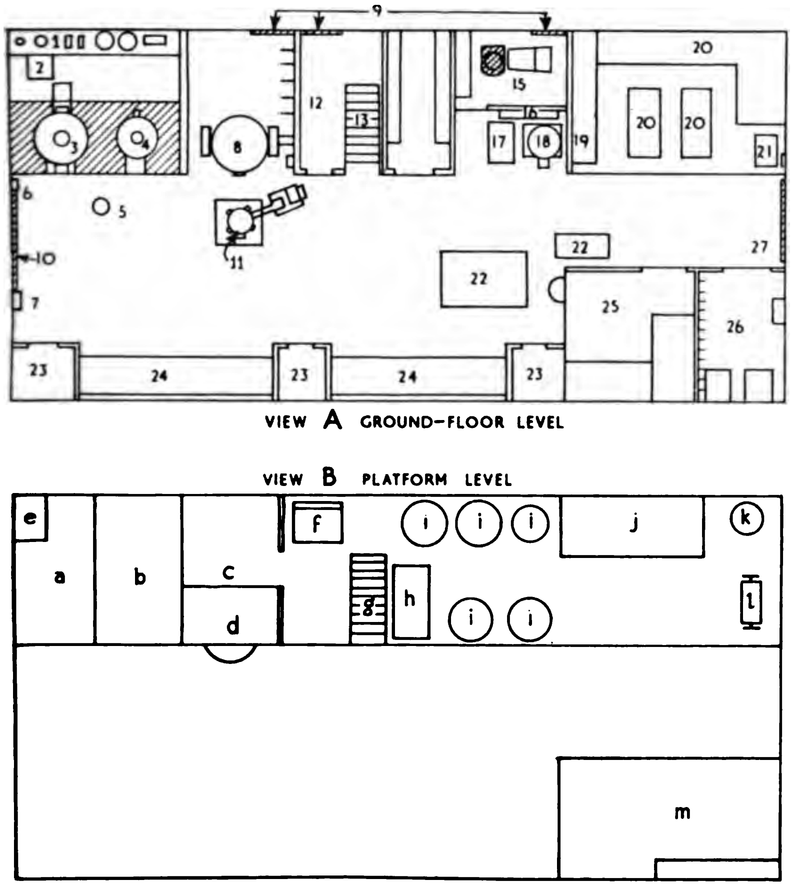

FIG. 1.—*Plan view of the foundry at Oundle School, showing the type and position of plant installed.*

Key: (1) shelf, (2) core oven, (3) 100-lb. furnace, (4) 60-lb. furnace, (5) sand tray, (6) control for air blasts and ventilating fans, (7) pyrometer meters, (8) large cupola, (9) doors, (10) emergency door with drop-bar release, (11) miniature cupola, (12) coke store, (13) staircase, (14) store, (15) compressor room, (16) showcase, (17) permeability apparatus, (18) Royer, (19) pattern cupboard, (2) benches for fettling, (21) grindstone, (22) storage space for moulding boxes, (23) sand pits, (24) moulding benches, (25) office, (26) changing room, (27) main door, (*a*) crucible store, (*b*) firewood store, (*c*) limestone, (*d*) chimney from cupolas, (*e*) extractor chimney from furnaces, (*f*) weighing machine (up to 4 cwt.), (*g*) staircase, (*h*) storage for boxes, (*i*) sand bins; (*j*) metal storage space, (*k*) paraffin drum, (*l*) buffer, (*m*) additional pattern storage.

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* The Author is a student at Oundle School (see Fig. 3).

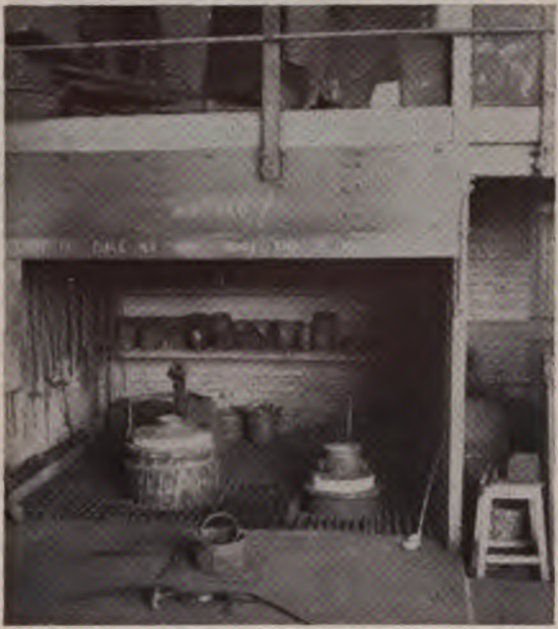

FIG. 2.—*View of the 100-lb. and 60-lb. capacity furnaces in the foundry at Oundle School; note the storage platform above (and the tidiness slogan chalked on the wall).*

small, and it was no longer weatherproof. Experience gained from the running of it, however, had shown convincingly that foundrywork was of the utmost value in the teaching of general workshop practice, and a new building was erected and equipped.

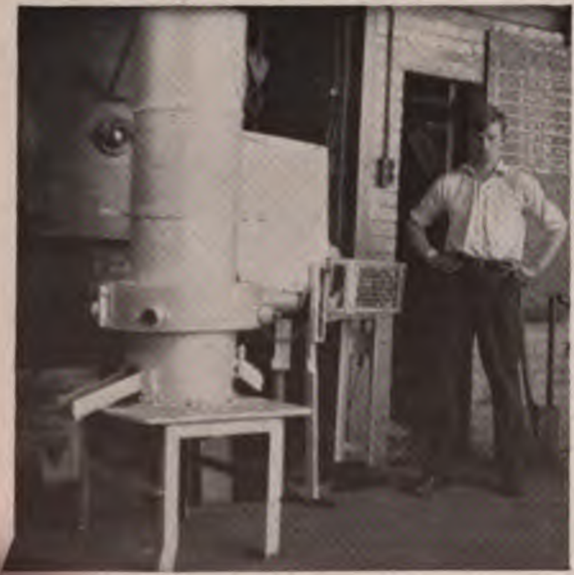

FIG. 3.—*Small cupola, built by the students of Oundle School (the Author of this article is standing alongside). Part of the School's larger cupola can be seen in the background.*

NEW FOUNDRY

The new foundry (Fig. 1) has a floor space of 1,800 sq. ft.—approximately twice that of the old building—and at the planning and erecting stages, the opportunity was seized upon to provide an overhead platform, running down the length of the shop, to carry the raw materials to be used. A new cupola capable of supplying ¾ ton of cast iron per hr. was bought, and two new non-ferrous furnaces, of 100-lb. and 60-lb. capacities respectively, were also installed (Fig. 2). The remaining new plant consisted of a double-ended motorized grinder and a Pneulec Royer sand-conditioning machine. The twelve benches—with cast-iron tops and welded angle-iron frames—were made from material salvaged from the old building. (The whole of the floor of the old foundry was comprised of cast-iron plates, made in the foundry.) The fettling bay in the new building has a wood-block floor, though the remainder of the working floor is of concrete. More recently, the foundry was presented with an air-compressor and a complete range of compressed-air-driven tools by Holman Bros., Limited. These consist of chipping tools, rammers, drills, etc., and are proving most useful. As an experiment, the foundry was lighted by a mixture of mercury-vapour and tungsten filament lamps, and this has proved most successful.

Miniature Cupola

Perhaps the greatest achievement by the new foundry is that of the designing and building of a miniature cupola (Fig. 3). Although the large cupola installed in the foundry was most efficient, it was felt that a smaller one was required to cope with the many small jobs that were often cropping up. Work was started on this project in 1956, and with three years of experiment and experience behind, it is now felt that the students have perfected a very creditable piece of apparatus. Not satisfied, however, work is to be started shortly with a view to designing and fitting a recuperator system to this small cupola, and this should improve on its already quite outstanding performance. Some twenty successful runs have been made with the cupola and some four tons of ordinary and high-duty iron have been cast. It has recently been found that it is possible to obtain a cast of 70 lb. of metal from the furnace.

It should be noted here that with the sole exception of the 1-h.p. electric motor, the cupola has been constructed by the students entirely from scrap metal, using the facilities of the School's pattern-shop, foundry and metalworking shop. The cupola, which has a diameter of nine inches, has a lining made up of local refractory materials compounded to the School's own formula. The writer believes it is fair to claim that this cupola may well be the smallest in the world that is in regular use.

Work Undertaken

resent, up to about 20 boys at a time receive tion at the hands of Mr. W. J. Taylor ally from English Electric Company, d), who has now been the foundry instructor School for 31 years. With his wide and gh knowledge of foundry techniques and his tanding of his pupils, his services to the y at Oundle are invaluable.

work undertaken in the foundry is by no limited to a narrow field. As in the other during their two years' training, boys carry ndard jobs from the blue-print stage, start- th patterns they have made themselves in tternshop. Subsequently, they machine and the castings in the metal shop. These jobs signed to exercise boys in the basic tech- of workshop-practice and include the manu- of hand tools (marking gauges, routers, etc.), drill-stands and shooting sticks. After sic training, boys in the foundry tackle a variety of jobs as the need occurs. For e, their work may include the making, in f desk legs for the School, firegrates, fire- r the School laundry, and sluice-gate wind- ipment for the Nene River Board, in n to parts cast for a variety of testing es that have been constructed for the 's engineering laboratory.

he non-ferrous field, ornamental brasses, golf , and shields are popular, and a wide variety ings are made for the various School depart- as well as for outside sources (Fig. 4). A erable amount of work, which has proved aluable and successful, has also been done field of bell-founding. Recently, three pre- ry schools have been equipped with bells in the foundry. Although little was heard the foundry produced some 18,000 castings descriptions for the war effort. New pro- are continually being tried out in the Oundle y, and the newer techniques—such as shell ing, lost-wax process and CO_2 Process—have n demonstrated.

System of Working

system on which the workshops are run to- briefly as follows: In each of the three terms academic year, every boy in the School has, e time, one week away from normal school-work. For at least the first three years in the School, boys must spend this week under strict supervision in the workshops. More-senior boys may, instead of going into the workshops, spend this week doing something of their own choice, which is not included in the normal school curriculum. For their first two years, boys carry out standard jobs in the carpentry, foundry, patternshop and metal shop. All these different jobs are designed to train boys in the various aspects of workshop practice and their progress and ability is recorded on a simple card-index system. After the preliminary training, boys work on a wider variety of jobs, and a boy may, if he wishes, specialize in a particular department. In addition to his week in the workshops, once each term a boy may voluntarily attend workshops in the evenings of half-holidays in the winter terms.

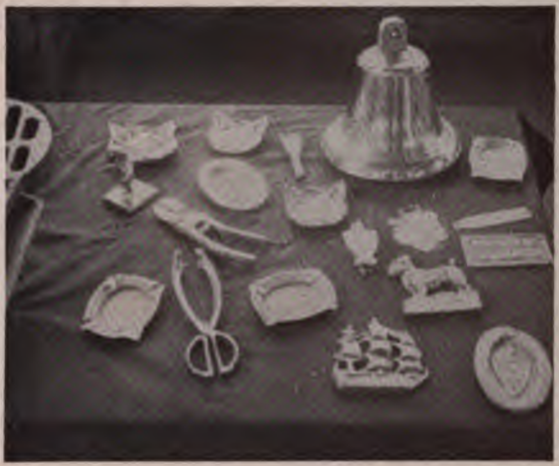

FIG. 4.—*Examples of castings produced in the non-ferrous section of the Oundle School foundry.*

Among Public Schools, it is hardly surprising that Oundle School has, for many years, been popular with manufacturers who wish their sons to enter their businesses with a thorough grounding in engineering techniques. Amongst the Old Boys of the School are a number of prominent members of the Institute of British Foundrymen who received their introduction to the technique of casting metals in the Oundle School foundry.

& Wade's New Belgian Company

ian subsidiary has been established by Broom ade, Limited, manufacturers of pneumatic ent, etc., of High Wycombe (Bucks), as a of increasing demand for "Broomwade" equip- nstalled in Belgium. Known as Broomwade- SA, the new company will not only control the ments of Belgium, but also those of Luxem- and the Belgian Congo.

resent the main purpose of Broomwade-Belge improve sales and servicing, but, with the an Common Market in mind, it will later le compressed units and portable plant locally, npressors being supplied by the parent company.

Brighter Prospects for Iscor

Profits of the South African Iron & Steel Industrial Corporation, Limited, reflected the steel trade recession to the extent of nearly £2,000,000, falling for the year ended June 30, 1959, to £10,800,000 (£12,500,000). There is a much improved outlook for the current year, export orders totalling £11,000,000 having been received from 30 different countries. Japan, which bought 275,000 tons heads the list, with the US second with 120,000 tons.

Iscor's output in the past year was 93,000 tons up at 1,740,000 tons. Good progress was made with the £56,000,000 expansion scheme and new rolling mills are to begin operating in a year's time.

Overseas Foundry Standards

With a recent issue of *BSI News*, published by the British Standards Institution, 2, Park Street, London, W.1, was distributed a leaflet dealing with a number of overseas and Commonwealth standards. Amongst these were listed three of major interest to the foundry industry as follow:

From Spain comes news of standard *No. UNE 36-651, "Cupola Furnaces: Terminology."* This is a single-sheet leaflet carrying a sketch of a typical cupola and forehearth and the names, in Spanish, of 35 component parts. The standard should have considerable interest for equipment manufacturers in this country who intend to supply furnaces to Spanish-speaking countries.

The second standard selected for comment is *Indian Standard No. IS 1305-1958, "Specification for Graphite for use as Foundry Facing Material."* This is a six-page standard priced at Rs. 1.50, issued by the Indian Standards Institution (9, Mathura Road, New Delhi, 1) in March, 1959. It follows much the same format as British Standards specifications and deals in part one with general requirements—terminology, certificate of compliance, supply and independent test—and in part two, with specific requirements. For the material under consideration, the latter are characterized by a table of composition, detailing two grades, both of which have maximum moisture-content of 1.0 per cent. and volatile matter 3.0 per cent. The first of the grades can carry an ash-content of up to 20 per cent. and the second up to 30 per cent., fixed carbon making up the balance in each case. Sieve fineness of both grades is specified in Table 2 and after comments on sampling, packing and marking, there are three appendices describing test methods, sieve sizes and sampling procedure respectively.

Details of the Russian Standard

The third foundry-industry standard referred to in the BSI leaflet is a Russian publication numbered *GOST 2133-57* covering the *Classification and Basic Dimensions of Foundry Moulding Boxes for Hand- and Machine-made Moulds.* (Note: This does not cover boxes and jackets used in snap-flask moulding, or jackets for moulds composed of cores alone, or yet boxes for precision- or shell-moulding).

In view of the fact that the British Standard for moulding boxes is already several years old, it is interesting to examine this new Russian publication in some detail.

First as to classification, three types of foundry boxes are covered, namely, those wholly cast in steel, grey-iron and light alloys; those welded from standard and specially-rolled steel sections, in addition to incorporating cast-steel components, and lastly, those bolted up from steel and grey-iron parts.

(N.B. The use of composite boxes is allowed only when it can be proved that it is impossible to use boxes of the first two types). According to the interior shape, all boxes are grouped into oblong or square, round, or special—*i.e.*, wedge-shaped—boxes, the choice being controlled by technological conditions of casting and by shapes of patterns. In the publication, sketches are reproduced to show examples of shapes and to indicate the main dimensions; but it is pointed out that the illustrations are not to be used to indicate the construction of boxes. All the sketches, however, indicate that one round and one slotted hole are normal in Russian two-pin box-parts and that all the holes are bushed.

According to the weight of the moulding sand and the box-part, all moulds covered by the standard are divided into three categories, *i.e.* (1) hand lifted (box-parts up to 66 lb. and sand up to 66 lb.); (2) combined lift by hand and crane (box-parts from 66 to 132 lb. and sand above 132 lb.), and (3) crane lifted where both the box-parts and the sand are in excess of 132 lb.

In a further section, the way of making moulds is designated, *i.e.*, whether in boxes for use on machines, for slinging and hand-ramming, or for core assembly, and whether in pairs, threes, or multiple-section box types, cast horizontally or vertically.

In the most important section of the standard, basic dimensions in mm., for a very large range of box-parts are quoted in two tables, and boxes made in special shapes are also catered for. Here, a total of about 600 sizes of rectangular boxes ranging from 300 by 250 mm. (12 by 10 in.) to 10,000 by 5,000 mm. (33 by 17 ft.) and 42 sizes of round boxes are recorded, many of them in up to 12 different heights between two and 40 in. Then, as a basis for calculation of constructional elements for all types of boxes, it is stipulated that an "average dimensional value" equal to half the sum of the length and the width (or the diameter of round boxes) be applied to determine which of the range be wholly cast (in steel, grey iron or light alloys), which shall be welded (from standard rolled-steel sections, specially rolled shapes or from cast-steel elements), and finally, which shall be bolted up of steel or grey-iron parts. To conclude, distances between the centres of holes for pins are stipulated and it is stated that the diameters of locating pins should be in accordance with (Russian) Standard 2529-44.

Pianoforte Frames

The following excerpt is taken from Vo. 1, No. 4, of *Gray Iron Designer's Digest*, published by the Gray Iron Founders' Society (USA):—

Behind the craftsmanship, beauty and quality of tone, of all America's quality upright and grand pianos, is a grey cast-iron plate, which is as intricate in design as any machine part. The plate must have rigidity, a low coefficient of thermal expansion, exceptional damping qualities, and many other qualities that make it an outstanding engineering and design accomplishment. As the material that most ideally meets all the requirements, grey iron is preferred over all other metals. First, this material has high damping capacity so that it will not vibrate in resonance with the strings. The plate casting has excellent dimensional stability so that the instrument will maintain tuning. The coefficient of thermal expansion must be carefully synchronized with that of the strings so that tone pitch is maintained even with change in ambient temperature. The beads and "V" bearings on the plates are formed so that they have a hard surface as-cast and resist "bedding-in" of the strings. A piano plate casting must also be very strong to resist the pull of approximately 50,000 lb. exerted by the strings without continued distortion (creep).

"PROSPECTS IN THE STEEL INDUSTRY are growing brighter every day, with output moving up to a new all-time peak," said the Master Cutler, Mr. P. J. C. Bovill, speaking at the annual dinner of the Insurance Institute of Sheffield at the Cutlers' Hall, Sheffield on December 7. He said that the measure of progress was the unemployment percentage, which was now down to 1.1 per cent. The Master Cutler said that modern designs, vigorous salesmanship and competitive prices were the means to realising the opportunities that now faced Sheffield industry.

port on the Annual eting of BCIRA

The need for more support from industry, in the form of increased grade B membership, was stressed at the 39th ordinary general meeting of the British Cast Iron Research Association, in London. A campaign for this purpose was suggested by the president, Mr. E. Player. The meeting included the presentation of the annual report, and other points dealt with—in addition to financial matters—were the election of the new president, vice-presidents, honorary members and Council.

e thirty-ninth ordinary general meeting of ritish Cast Iron Research Association was held last month, at the Connaught Rooms, t Queen Street, London, W.C.2, with the dent, Mr. E. Player, C.B.E., in the chair. On roposal of Mr. C. C. Booth, seconded by Mr. G. Hall. the Minutes of the thirty-eighth ary general meeting, held in London on mber 4, 1958, were approved and signed.

Report and Accounts

e President, presenting the thirty-eighth al report* of the Council of the Association, the accounts, for the year ended June 30, said both had been previously circulated. The rt showed the immense amount of activity by Association during the previous year, he said, gave a clear picture of the tasks recognized eing in most urgent need of attention, of the s available for this work, and the Association's igent anticipation of future needs.

for More Support

ter examining an analysis of the gross annual ne handed to him by the secretary, the Presi- then said that it was gratifying that the Asso- n now had 272 Ordinary (B) Members in the d Kingdom, who were making a contribution 3,519 1s. 1d. This represented something like per cent. of the Association's total member- The Association could not expect that all bers, many of whom were small firms, would into Grade B membership. When a new ne was launched, there was a response from more farseeing, or more generous, or more siastic members, which was good evidence of alue of the scheme. After the initial launch- many members, unless constantly reminded, d let matters lie, although they were not sed to the idea. Therefore, he hoped the Asso- n would not allow this very important source venue to dry up by failing to remind people they had not yet made the Ordinary (B) Grade. aid he knew how vital matters could become competently managed. He felt that, money so important to the Association as to every- lse, it would be good to have a campaign, not ng the Association a nuisance to people, but ing out to them that the BCIRA needed a measure of their support. The industry had in the Association, he was proud to say, a model of what an organization of that kind could be.

MR. M. M. HALLETT, seconding the adoption of the report and the accounts, said the annual general meeting was the occasion when ordinary members were able to receive from the Council an account of their stewardship of the affairs of the Association during the previous year: as the president had said, the Council felt that the report was one of which they could be proud. The increasing expenditure was a sign of the demands made by the industry upon the Association and, of course, it was a healthy sign. During the past year their concern had been largely one of finance. Because of the growing stature of the Association, the Department of Scientific and Industrial Research had imposed on it rather stiffer terms on the financial side. These terms constituted a challenge, because the Department had held out the "carrot" of larger grants if the Association could help itself. That was what the Council was trying to do by introducing the Grade (B) membership scheme, and he endorsed the president's remarks on that matter. (The president having formally proposed that the annual report of the Council for the year ending June 30, 1959, and the accounts, showing the position of the Association's affairs as at June 30, 1959, be approved and adopted, the resolution was then seconded by Mr. M. M. Hallett, and carried unanimously.)

Election of Council

Council

On the proposal of MR. G. R. BUCKLEY, seconded by MR. K. MARSHALL, the meeting resolved that: (1) the following members of Council, retiring automatically under article 29, and eligible for re-election, be re-elected: Mr. C. C. Booth, J.P., M.I.MECH.E.; Mr. W. J. Colton, F.I.M., A.M.I.MECH.E.; Mr. E. C. Dickinson, M.MET., F.I.M., A.M.I.MECH.E.; Mr. F. V. Everard, M.I.MECH.E., J.P.; Mr. M. M. Hallett, M.SC., F.I.M.; Mr. R. L. Handley, B.SC.(TECH.), A.M.I.E.E.; Mr. W. H. Harper; Lt.-Colonel H. H. Jackson, O.B.E., J.P.; Mr. S. H. Russell, O.B.E., C.G.I.A., and Mr. G. R. Shotton, F.I.M.; (2) Mr. H. A. Redshaw, appointed a member of Council in July, 1959, in accordance with article 31, be elected, and (3) Mr. J. Bell, Mr. G. E. Lunt and Mr. C. H. Wilson be elected members of Council in accordance with article 25. The proposal was carried unanimously, and Mr. Marshall congratulated the Association on having such

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blished in the JOURNAL of December 3, page 545.

Annual Meeting of BCIRA

an able body of men to direct its affairs.

Lt.-Colonel Jackson said that up to then he had been elected to the Council as a member of the Council of Iron Producers, but the meeting had now done him the honour of electing him a member of Council " under his own steam." He said he was very appreciative of that honour.

New President

Mr. E. Player proposed the election of Mr. C. R. Wheeler, C.B.E., as president of the Association in accordance with article 24. The retiring president said Mr. Wheeler was very well known to members and to the industry in general and would prove, he felt certain, a splendid servant and an ornament to the Association.

Mr. N. P. Newman, seconding, said that Mr. Wheeler was indeed very well known in the industry; in fact at the end of the last war he had been Iron and Steel Controller. He had been connected with the Association for many years and it could not possibly have a better president. Mr. Newman added that Sir Frederick Scopes, who had had to leave the meeting, had asked him to say that he wished to be associated wholeheartedly with the proposal. (Mr. Wheeler was then unanimously elected.)

Thanks to Retiring President

Mr. S. H. Russell then proposed that the warmest thanks be accorded Mr. E. Player, the retiring president, for his past services. Two years ago the Association had been faced with a dilemma, for the then president, Mr. J. J. Sheehan, had become a resident in Eire and was thereby disqualified, owing to unfortunate nationality regulations, from serving on the Council or in any office of the Association. Mr. Player then undertook the office of president for a year, to the great relief of the Council, and later agreed, though with reluctance, to serve for a second year. The Association had worked him rather harder than some presidents: in particular, he had presided at the function when a presentation was made to Dr. Pearce on the occasion of the latter's retirement as director of the Association. Later on, Mr. Player had inaugurated the Association's experimental cupola plant; he was a very busy man but always attended meetings, and had so guided the affairs of the Association that all connected with it were extremely grateful to him.

Mr. H. J. V. Williams, seconding, said members would also wish to thank Mr. Player for his valuable assistance on the occasion when a deputation attended the Department of Scientific and Industrial Research. The proposal was accorded with acclamation, and Mr. Player briefly acknowledged it.

Vice-presidents

On the proposal of Mr. P. A. Russell, seconded by Mr. T. M. Herbert, the following were elected as vice-presidents of the Association in accordance with article 24: Sir William Scott, O.B.E., J.P., M.I.MECH.E., and Sir Henry Spurrier, M.I.M.E. Mr. C. H. Wilson, president of the Institute of British Foundrymen, was also elected a vice-president in accordance with article 24.

On the proposal of Mr. A. E. Pearce, seconded by Mr. H. G. Hall, it was resolved that the warmest thanks of the Association be accorded to Mr. A. E. Peace for his work as vice-president, from which office he was now retiring in accordance with article 24. (The proposal was carried with acclamation.)

Honorary Members

Mr. Richard Miles proposed the election of Dr. J. G. Pearce, C.B.E., and Mr. E. Player, C.B.E., as honorary members of the Association. He said that it was an extremely good thing for those concerned with the work of the Association to have old friends with them, particularly old friends with the experience and ability of Dr. Pearce and Mr. Player.

Mr. R. L. Handley, seconding, said the members were very conscious and appreciative of the work which the immediate past-president and the former director had done for the Association. He hoped they would accept the proposal in the spirit in which it was made; the members were grateful and were trying to express their gratitude. (The proposal was carried with acclamation.)

Dr. Pearce then said how gratified he was to be elected an honorary member. Mr. Handley had rather suggested that it might be intangible, but he could assure the meeting that it was none the less pleasurable. Following this, Mr. Player also thanked the meeting very much for the quite distinctive honour of his election, and said that he appreciated it very much.

Auditors

H. Overton, Salt & Company, chartered accountants, were automatically re-appointed auditors to the Association in accordance with section 159(2) of the Companies Act, 1948.

Votes of Thanks

Council, Committees and Sub-committees

Mr. J. Bell proposed that the warmest thanks of the meeting be accorded to the Council, committees and sub-committees for their work during the year. The proposal was seconded by Mr. G. E. Lunt, and the vote of thanks was heartily accorded.

Chairman

Mr. H. A. Redshaw proposed that the best thanks of the meeting be accorded to the Chairman for having presided.

Mr. M. M. Hallett, seconding, said that it gave him genuine pleasure to do so. The occasion was Mr. Player's " swan song," his last official act in his two years as president of the Association; although he had already been thanked for it, in thanking him for his chairmanship of the meeting, the members were thanking him also for the two years' outstanding service he had given them. Mr. Hallett added that he was proud to be the last speaker before Mr. Player vacated the chair. (The resolution was carried with enthusiasm, and Mr. Player briefly responded.)

and Staff

RESIDENT, paying tribute to the magnificent
the director and his staff during the pre-
ar, said that they, after all, were doing the
e work; the officers and committees could
ly in an advisory capacity. No matter how
general might be, he could do little without
ient army, he said, and the Association
ongratulate itself on the good work done
past years under Dr. Pearce and now
rried on so well by Mr. Morrogh, the new
More than anything else, that was
ble for the high regard in which the Asso-
was held, he believed, and not only in
but all over the industrial world. Nearly
: had to work for a living, but a major
on for all BCIRA staff, he was firmly con-
was the urge to discover something new,
new problems, and to bring about further
in the ironfounding industry. Salaries
f course, of some importance, but such
he had in mind did not work only for
they received. Their work was of con-
high quality even when it produced nega-
wers; that was the way of life. If progress
be made, he continued, one had to realize
vas possible to learn more from apparent
than from facile success. The struggle
the unknown laws of nature, the practical
es, and so on, were only too well known
esearch staff, but they often came out of
ggle quite successfully, and it might be
that the value of their work was beyond
; that could be bought for money. He
ie members to express appreciation of the
of Mr. Morrogh and his staff, and the hope
y would remain with the Association, in
alth, for many years, to continue to con-
:o progress. (The resolution was carried
husiasm.)

I. MORROGH, the director, on behalf of his
es on the staff and himself, returned thanks
chairman's kind expression of appreciation
warm response of the meeting. He said
and his staff were very well aware of, and
for, the continuous help and support which
eived from the officers and Council and
; of the various committees and sub-com-
in discharging their responsibilities, and
forward with pleasurable anticipation to
the many duties which they knew lay
This concluded the meeting.)

* * *

was an informal luncheon after the meet-
hich MR. C. R. WHEELER, the newly-elected
t, who had been unable to attend earlier,
. He took the opportunity of acknowledg-
lection as president, which he described as
great honour, also associating himself with
l wishes which the meeting had expressed
earce, and saying how much he had appre-
iowing him over the years.

ELECTRIC TOOLS, LIMITED, announce that their
ranch has moved to new and larger premises
ean Street, Bristol, 2.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

809,133. Sintercast Corporation, 134, Woodworth Avenue, Yonkers, 2, New York, USA.

Production of hollow bodies, in particular of hollow thermal elements such as turbine blades, buckets and nozzle vanes, which are subjected to high stresses at high operating temperatures under corrosive conditions. The inventors employ a combination of powder metallurgy using titanium carbide and interstitial casting also known as infiltration.

809,270. Deutsche Gold und Silber Scheideanstalt Vormals Roessler, 9 Weissfrauenstrasse, Frankfurt (Main), Germany.

In the charging of high-vacuum induction furnaces, the inventors claim a method in which the use of the charging lock chamber and the manipulations associated with it, are obviated, and the free drop of fresh material into the crucible is avoided.

809,283. Lev Petrzela, Brno, Czechoslovakia.

The recovery of moulding sand and waterglass from waste sand obtained from cast moulds or cores prepared from a mixture of these substances and hardened by the action of carbon dioxide. This process is described in B.P. 654,817. The waste sand is heated to above 400 deg. C., so as to cause the hydrated silica to combine with the alkali-metal-carbonates to form a mixture of alkali-metal-silicate and sand. This silicate is then dissolved in water hydrothermically at a temperature above 100 deg. C., and at a pressure exceeding atmospheric pressure by more than 0.1 kg. per sq. cm.

809,540. J. B. Brennan, 13018 Lake Shore Boulevard, Cleveland, 8, Ohio, USA.

Castings of titanium or similar metals and their alloys.

809,629. H. J. Daussan, 9 Avenue Leclerc de Hautecloque, Metz (Moselle), France.

This invention relates to the casting of metals or alloys giving rise to gas or fumes. Examples given are of effervescent steel which gives off carbon monoxide, and also the sulphur, lead, lead-sulphide, and phosphor-steels. The distinctive feature of this process is that in the course of casting the emanations are collected in a gas-trapping chamber, carried by an apertured float which floats on the bath of molten metal.

809,954. Metropolitan-Vickers Electrical Company, Limited, 1-3 St. Paul's Churchyard, London, E.C.4.

An improvement in this company's lost-wax process, patented in specification B.P. 722,816. Under this new invention, only the initial coating is formed from a material comprising a filler of refractory material (e.g. zirconium silicate), suspended in a silica sol.

* * * *

647,784. "Improvements in or relating to hoppers, storage bins and like containers, and apparatus controlling the delivery of material therefrom." This patent was revoked by order of Court dated July 27, 1959.

Mr. K. G. HARRIS has been elected a fellow of the Institution of Metallurgists.

British Blast Furnaces in the September Quarter, 1959

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the third quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hema-tite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	—	1	—	1	1.9	4
Kettering Iron & Coal	—	—	—	—	—	—	2
Renishaw Iron	—	—	1	—	1	1.6	2
Sheepbridge	—	2	—	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	—	4	—	4	3.3	5
Staveley Iron & Chemical	—	—	3	—	3	3	4
Stewarts and Lloyds: Corby	—	4	—	—	4	3.9	4
Wellingboro' Iron	—	1	—	—	1	1	3
TOTAL	—	7	10	—	17	17.7	27

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	—	—	—	—	—	1
Darwen & Mostyn Iron	—	—	—	1	1	1	2
Lancashire Steel Manufacturing	—	2	—	—	2	2.9	3
Summers, John	—	2	—	—	2	1.9	2
TOTAL	—	4	—	1	5	5.8	8

North-West Coast.

Barrow Ironworks	2	—	—	—	2	1.1	4
Charcoal Iron	—	—	—	—	—	0.5	1
Millom Hematite Ore & Iron	2	—	—	—	2	2	2
United Steel: Workington	3	—	—	—	3	3	3
TOTAL	7	—	—	—	7	6.6	10

Lincolnshire.

Appleby-Frodingham Steel	—	3	—	—	3	3	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	3
TOTAL	—	8	—	—	8	8	10

North-East Coast.

Consett Iron	—	3	—	—	3	2.3	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	—	—	—	—	—	2
Bessemer	—	—	—	1	1	1	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	3
Normanby Iron Works	—	—	—	—	—	0.3	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron:							
West Hartlepool	—	2	—	—	2	2	2
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	2	13	—	1	16	15.6	28

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	—	—	2	2	3
Carron	—	—	1	—	1	1	4
Colvilles: Clyde Iron Works	—	1	—	—	1	1	3
Ravenscraig	—	1	—	—	1	1	1
Dixon's Ironworks	—	—	—	—	—	—	6
TOTAL	1	3	1	—	5	5	17

South Wales and Monmouthshire.

Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	2.5	3
Steel Company of Wales: Margam	—	5	—	—	5	4.1	5
TOTAL	1	10	—	—	11	9.6	12

Scots Foundries to Close

The Mirrlees Watson Company, Limited, Glasgow, are closing down two of their three foundries on March 1 next year. The foundries are at Laidlaw Street, Glasgow, and the one attached to the engineering works at the subsidiary company, Pott, Cassels & Williamson, Limited, Motherwell. Foundry production to meet the needs of the group is to be concentrated at the works of another subsidiary company, Blairs, Limited, Govan, Glasgow. Between 60 and 70 men are employed at the Laidlaw Street foundry and less than half that number at the Motherwell foundry.

Difficulties

Mr. J. Malley, managing director of the Mirrlees Watson Company, said: "In a modern engineering industry it is a little difficult to maintain the foundry capacity one used to maintain or tried to maintain in the past." There were different reasons for the two foundries being closed. The Motherwell foundry was an old one, and modernization would be too costly. Because of output, he said, it would have been difficult to maintain it in a competitive position. At Mirrlees Watson, however, the situation was different. There was a tendency to-day to welded construction which was taking away business from the foundry trade. Tied foundries were not in a position to compete with free foundries, and quite a number of companies specialized purely in foundry work. The group manufacture sugar machinery, chemical plant, condensing plant, pumps and water-distilling plant, etc.

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SC Link with the Past

worth of quality castings is illustrated in
article abstracted from an ESC *Informa-*
—

uate the name of the English Steel Cor-
ited,—or at least one of its forbears,
rs & Company—throughout the world.
ɔ, bell casting was a prominent activity
kers, Sheffield. In fact bells formed one
ɪpplications of the techniques of steel
imported from Germany.

ɪm those days indicate that those bells
d—not only for churches and chapels,
e-alarms, lighthouses, steamships, schools,
ɔlantations. From the occasional reports
ıe Corporation of bells still in use and
t is learnt that there is a Naylor Vickers
1866, in the Cathedral of the Pines at
Hampshire, USA. This bell hung for
the townhall tower at Keene, New Hamp-
'athedral in which it is now set is in a
ve of pines on a hilltop. It is non-
ıl and is dedicated as a memorial to the
ɡn wars.

British Blast Furnaces in the September Quarter, 1959—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of third quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall Iron & Steel	—	—	—	—	—	—	2
Shelton Iron & Steel	—	2	—	—	2	2	3
Stewarts and Lloyds: Bilston	—	1	—	—	1	1	2
TOTAL	—	3	1	—	4	4	9

Sheffield.

Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	11	50	12	2	75	74.3	123

Weekly Average Number of Furnaces in Blast during the September Quarter, 1959, and the Previous Four Quarters

District.	1958.		1959.		
	Sept.	Dec.	March.	June.	Sept.
Derby, Leics., Notts., Northants, and Essex ..	19.2	20	20	18.8	17.7
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	7	6.9	6.9	7	5.8
Lincolnshire	9.1	9.5	8	8	8
North-East Coast	17.7	18	17.4	17	15.6
Scotland	7	6.7	6	5.8	5
Staffs., Shrops., Worcs., and Warwicks.	5	5	4.9	4	4
South Wales and Monmouth	10.9	10.4	9.5	9.6	9.6
Sheffield	2	2	2	2	2
North-West Coast	5.7	6	7.4	7	6.6
TOTAL	83.6	84.5	82.1	79.2	74.3

The following companies have furnaces in course of construction or rebuilding:—Lancashire Steel Manufacturing; Millom Hematite Ore & Iron; South Durham Steel & Iron (West Hartlepool); J. Lysaght's Scunthorpe Works; Bairds & Scottish Steel.

Iron and Steel Developments in New Zealand

Australian mining and financial interests are reported to be prepared to invest in New Zealand's proposed iron and steel industry. A representative of these interests has called for an immediate survey of every known iron-sand deposit and coalfield, at an estimated cost of £250,000. If the evidence justified the project, expenditure on plant would be £NZ12,000,000 and in the following five years a further capitalization of £NZ25,000,000 would be needed to provide a steel plant, to supply the Dominion with 75 per cent. of her steel requirements.

Survey results indicate that the Lake Taharoa is potentially the most important deposit of iron sands on the west coast of North Island, with an estimated 173,000,000 tons of sand. The Patea deposit contains 14,000,000 tons and Muriwai 17,600,000 tons of recoverable iron sand. At the mouth of the Marokopa river, recoverable iron sand amounts to 29,000,000 tons, but access is more difficult than elsewhere.

Pacific Steel, Limited, is to build a scrap-steel mill at Auckland at a cost of £NZ2,500,000. The mill will use metal now being exported and is expected to produce steel to the value of £2,000,000. Production capacity of the mill will be 40,000 to 50,000 tons of steel per year.

Mr. Richard Miles, who is chairman and managing director of Head, Wrightson & Company, Limited, has been appointed a director of Franco Signs, Limited.

Notes from the Branches

Northampton Section

The November meeting of the Northampton and district section of the Institute of British Foundrymen was the first of many to be held in the Lecture Theatre of the Wellingborough Technical College, due to the section's old meeting room in the Hind Hotel being no longer available. The speaker was Mr. J. L. Francis from Foundry Services, Limited, and the title of the lecture "A Study of Casting Defects." Mr. Burns, of the same firm, was also present and took part in the discussion. Defects under consideration included those of steel, light-alloys and bronze as well as grey iron.

Mr. Francis illustrated his talk with slides, and dealt first with skin finish and sand properties and moulding conditions necessary to avoid burning on and scabbing. He emphasized the need for selecting a sand which did not have a uniform grain-size and suggested that a grading should give at least 70 per cent. on three adjacent sieves. The grading should be fine enough to give adequate skin finish whilst being coarse enough to allow easy escape of steam and gases. So far as core-binders were concerned, Mr. Francis pointed out the importance of understanding not only the amount of gas which is evolved on casting but also the time taken to produce this gas with respect to the condition of the casting whether or not it be in its molten state.

Porosity in iron, steel and light-alloys was dealt with at some length, the mechanics of progressive solidification and mass solidification were also explained, and the use of external chills and their influence on cooling *pro rata* to their size and position was given in the shape of some simple formulae. After giving details of the Williams core for atmospheric feeding, Mr. Francis had to abandon the rest of his talk because of shortage of time, and what follows is a summary of the ensuing discussion, during which the members found Mr. Francis and Mr. Burns to be well on top of their subject, and prepared to handle questions in a most frank and straightforward fashion.

Discussion

A member who asked Mr. Francis for his opinion on the effectiveness of denseners inserted into bosses of automobile castings because, he said in his experience, porosity still occurred where denseners were used, received the reply from Mr. Francis that he doubted this and thought it more likely that moisture had been picked up on the chill and that the defect described was most probably trapped gas. Answering another member who asked for an explanation of the reason for porosity in thin sections of metal where the adjacent mass of metal was solid, Mr. Francis said he thought it possible that here again the defect might not be porosity but trapped gas. He also suggested that there was a possibility of local overheating of the core or mould or in other words a local "hotspot." Asked for comments on the use of silicon-carbide chills as opposed to cast-iron, Mr. Francis gave it as his opinion that silicon-carbide chills were undoubtedly useful especially from the point of view of continuous usage; their heat conductivity, however, was less than that of cast-iron.

Inoculation Effects

His opinion on the effects of inoculation on internal soundness was next asked for, and in reply Mr. Francis said that inoculation tended to contribute to internal porosity and spoke of recent work being done by the British Cast Iron Research Association on this subject, with regard to inoculants and their influence on increasing the number of eutectic cells. Following further discussion on this point he agreed that aluminium was present in most ferro-silicons and contributed towards the inoculation effect. There appeared to be a critical value of residual aluminium in cast-iron (0.01 to 0.02 per cent.) which gave rise to hydrogen porosity. The term "oxidized iron" was then referred to, and Mr. Francis was asked if he had experienced this condition. The speaker replied that the condition often referred to as oxidized iron arose from cupola operation which allowed iron to melt too close to the tuyeres. As a result the melting loss of silicon and manganese would be higher than normal. Also a higher sulphur pick-up would be obtained. Iron melted under these conditions had low flowing power, contained gas and often showed inverse chill.

Questioned on the benefit obtained by the use of strainer cores, Mr. Francis said he thought that strainer cores were a modified form of pencil gating. They were best applied at the bottom of the down gate where they functioned as a choke. To another question as to the effect of pouring times on the soundness of castings, Mr. Francis replied that generally speaking, slow pouring, consistent with producing castings free from trapped gas and misruns, was more likely to give a casting free from internal porosity than one poured more quickly.

Tees-side Branch

The Tees-side branch held its annual social evening on Friday, December 4 in Teesdale Hall, Thornaby-on-Tees. The guest of honour was Mr. C. H. Wilson, IBF national president, who, on behalf of the Tees-side Council, presented an inscribed silver cigarette-case to Mr. Frank Shepherd in appreciation of his services as past-president and—for 13 years until his retirement in April of this year—as secretary of the branch. The photograph shows, from left to right, Mr. Frank Shepherd; Mr. C. H. Wilson; Mr. T. Wolverson, branch president, and Mr. G. Morris, branch secretary.

on Branch Dinner
e illustrations above were taken at the annual er/dance of the London branch of the Institute of sh Foundrymen, held at the Cafe Royal, Regent t, last month (see JOURNAL, November 26). On left, Mr. J. Bain, A.M.I.MECH.E., London branch dent, and his wife (carrying bouquet) are receiving Mr. and Mrs. D. Cherry Paterson. In the second picture, Mr. C. H. Wilson (IBF national president) and Mrs. Wilson, who assisted at the reception, are greeting Mr. and Mrs. L. A. S. Harbourne. The function was attended by just over 300 and the dinner was followed by a minimum of speech-making, with light entertainment and dancing until midnight.

News in Brief

ADFIELDS, LIMITED, Sheffield, held the 51st annual er of the Ambulance Society of the firm on Decem- 5. The Lord Mayor of Sheffield, Alderman A. V. stenholme, who presented the prizes mentioned Hadfields was the only firm in Sheffield with a time medical officer.

VENTY MEMBERS of the Women's Advisory Council olid Fuel visited Newton Chambers & Company, ted, in Sheffield on December 7 and 8. During tour of the company's extensive works, the party every stage in the production of the Redfyre -fuel-heating appliances.

IE EAST ANGLIAN SECTION of the Institute of sh Foundrymen is holding a meeting on Decem- 21 in the Lecture Hall of the Public Library, ich, commencing 7.30 p.m. The evening will be ted to the showing of films, amongst which will "Design and Patternmaking" and "Britain's iest Steel Castings."

IE GLASGOW ENGINEERING FIRM of John Dalglish ons, Limited, have secured a Russian order worth ,000 for a synthetic rubber plant for Siberia. Mr. Dalglish, managing director of the company, who to Moscow earlier this year to discuss the plant the Russians, has just returned after a further weeks in Moscow, where all the negotiations were ed out. The order will take about a year to plete.

CONTRACT has been signed between Voest, AG, the Wellman Smith Owen Engineering Corpora- Limited, for the exclusive co-operation between two companies in the United Kingdom for the n, supply and erection of plant and equipment the LD-steelmaking process. The contract was d in Linz by Mr. Hitzinger and Sir Peter Roberts. technical advice of these leading suppliers of steel and associated equipment will thus be available ritish steelmakers.

"WE HAVE MORE ENGINEERING VACANCIES at Sowerby Bridge than we can fill," said Mr. J. B. Branch, youth employment officer for the Calder area of Yorkshire, at the meeting of the Calder Divisional Education Executive on December 4. He added that this was the reverse of conditions which obtained at Easter. Mr. Branch said that school-leavers in the area need have no fear of unemployment even during the bulge years. It was easier to place young people in employment to-day than at any time since 1954.

ASHMORE, BENSON, PEASE & COMPANY, LIMITED (a member of the Power-Gas group), Stockton-on-Tees, have received a contract valued at approximately £4,000,000 for the design, manufacture and erection of two complete blast furnaces for Richard, Thomas & Baldwins, Limited. The two furnaces will each have a hearth diameter of 30 ft. and will be installed at Spencer Works, near Newport, Monmouthshire, to provide iron for Richard, Thomas & Baldwins, Limited's, new integrated steelworks and strip mill.

JESSOP-SAVILLE, LIMITED, held the annual dinner of their Twenty-five Years' Service Association at the Brightside Works canteen, Weedon Street, Sheffield, on December 5. Mr. F. Wardrobe, a retired director, presented Mr. C. H. Price, the firm's purchasing agent, with a certificate and gift in recognition of 40 years' continuous service. Other 40 year certificates were presented by Mr. L. Chapman, chairman of the company, and new members were presented with watches by Mr. R. P. Wallace, managing director. There are now over 400 members of the Association.

TUBE INVESTMENTS, LIMITED, announces that its subsidiary, the Chesterfield Tube Company, Limited, has reached a "know how" agreement with the Superior Tube Company, of Norristown, USA, on the manufacture of beryllium. As a result of the agreement, the latter company will be supplied with the techniques of beryllium-tube drawing and finishing developed by the Chesterfield Tube Company and the TI research and development division, and the future

News in Brief

beryllium research programmes of the two companies will be co-ordinated with a full exchange of information.

Mr. E. W. Hancock, chairman of the Coventry Productivity Association, presided at the dinner, held on November 30, to celebrate the fifth anniversary of the formation of the Association. The dinner was given by the Lord Mayor of Coventry, Ald. W. H. Edwards. Mr. C. Taylor, vice-chairman of the Coventry Association and divisional organizer of the AEU, said that no sane and reasonable person doubted the need for increased productivity. The trade union movement realized it and was prepared to give its support. Increased productivity would mean improved standards of living.

The governors of the Works School of Howard & Bullough, Limited, Accrington, have accepted a proposal of the Accrington Divisional Education Executive that the school be incorporated into the College of Further Education in September, 1960. The acceptance is subject to the understanding that students will receive the same facilities for studies and that representatives of employing firms shall have full facilities for practical consultation with the College staff. The Howard and Bullough School was opened in 1947 with 150 students on the roll. By this year, however, the number of students had fallen to 83.

Though Renishaw Iron Company, Limited, is now part of the vast Tube Investments organization, the old traditions are being maintained. Recently one of these, the 177 years old ceremony of blessing the furnace, took place. The Rector of Eckington, the Rev. C. S. Branson and Eckington's Methodist Minister, the Rev. E. F. Willis, led the procession of choirboys through the works to the foot of the furnace. There, before a congregation which included company directors, trade union representatives and iron workers, the Rector blessed the furnace. After the blessing the furnace was re-lit.

Dr. A. Rees-Jones, general manager of Parkinson Cowan Appliances, Limited, Birmingham, stressed the vital rôle of the foreman in modern industry as an aid to sound industrial relations, when he addressed delegates to a conference organized by the Midland region of the Institute of Industrial Supervisors. Shop-floor supervision, he said, was a major element in the chain of management; the foreman had an important part to play in helping to increase productivity and it was essential that he be adaptable to changing techniques in engineering production and that he rejected outworn methods of management of men.

Birmingham University Faculty of Commerce is to co-operate in a full-scale survey into the motor industry in the Midlands which is being undertaken by the Midland Regional Advisory Committee of the TUC, with the purpose of analysing the dependence of the West Midlands on the automobile industry. The survey will also cover ancillary industries such as foundry, drop forgings, springs, etc. It is anticipated that the findings of the survey will be used in framing policy concerning the automobile industry, especially in the siting of plants under the £150,000,000 expansion schemes which the industry is planning.

The Incandescent Group of Companies (which includes Incandescent Heat Company, Limited, Metalectric Furnaces, Limited, Controlled Heat and Air, Limited and Selas Gas & Engineering, Limited) has for many years supplied thermal engineering equipment *inter alia* to the foundry and metallurgical industries of South Wales. In the light of the present and future industrial importance of the area, the group has now opened an area office at 40, Newport Road, Cardiff ('phone: Cardiff 37715). It is under the management of Mr. J. W. Payne, who has been operating for the group in South Wales for the past two years.

New premises of the Aston Aluminium Warehouse Company, Limited, in Clement Street, Birmingham, were officially opened by Mr. H. R. Murray Shaw, director of the Aluminium Industry Council, on December 1. The company, formed 10 years ago, operates as a distributor for semi-manufactured aluminium ready to be fitted, it also supplies certain specialities for the building trade. Two previous moves have been made by the firm owing to expansion of business. In the new premises, aluminium has been used as extensively as possible to illustrate the various ways in which the material can be used in building construction.

Mr. H. E. Hill, chairman of the Laycock Engineering Company, Limited, and of the Birfield group who presented awards at the apprentices training centre at Laycock's Victoria Works, Millhouses, Sheffield, addressing the apprentices, said that "the only way to a secure future is for everyone to make the maximum contribution and to think more of what they are putting into work than of what they are taking out. If we are going to come unstuck in this country it will be because of the emphasis people are placing to-day on their rights without thinking nearly enough about their duty." Mr. H. G. Smyth, personnel manager, said that two out of three apprentices taking courses at the training centre passed their examinations, and this was above the national average. He added that while at present, apprentices did a full-time course for a year at the training centre before going to the workshops, the company was considering extending it to a two years' course, and this would mean extending the centre. Mr. Hill also attended the 12th annual dinner of the Laycock 25 Club, held at the Grand Hotel, Sheffield, when he made long-service presentations to ten employees who had each been with the company for 25 years.

Obituary

The death is announced of Mr. William Cotton, managing director of William E. Cotton & Sons (Brassfounders), Limited, Hanley, Stoke-on-Trent. He was 45. He became senior partner in the firm on the death of his father 12 years ago.

The death has taken place of Mr. John W. Finlay, a former secretary of the Port Clarence works, Middlesbrough, of the Anderston Foundry Company, Limited. He retired in 1947 after 50 years with the company, having started in the Glasgow office, moving to Teesside in 1928.

A former works manager of Norton Industries, Limited, engineers, founders, metal merchants, etc., of Wolverhampton, Mr. Fred Darling, has died at the age of 51. He went to Wolverhampton in 1937 to take up the post of engineer and shop supervisor with the Turner Manufacturing Company, Limited, diesel engineers, manufacturers of aircraft components and winches.

Mr. Kenneth Maclean Burder, chairman and managing director of Messenger & Company, Limited, ironfounders and horticultural engineers, Loughborough, Leicestershire, since 1942, died on December 1, at the age of 77. His family first became associated with the company in 1874. His father was a former joint managing director while his only son, Mr. F. G. M. Burder, is at present a director. Mr. Burder was one of the oldest members of the Institute of British Foundrymen having joined in 1905.

THE NIGHT BEFORE CHRISTMAS,
ALL THROUGH THE SHOP...

asting was stirring; production had stopped.
ddenly there appeared in a fiery display,
d Santa, in his jet propelled sleigh.

d to the foreman standing there in the murk,
r own homemade mixes that foul up your work ! "
reached in his bag, and said, " Here's the trick !
ift to die casters—that's famous DIE SLICK."

s and odourless, it's sweeping the nation.
cycles with just one application.
erent grades that will spray on real fast—
or aluminium, magnesium or brass ! "

s up the castings, won't discolour or mar . . .
ut Boys. There's no better by far ! "
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tings came out just as slick as you please.

a gallon—what can you lose?
king, non-staining, so easy to use !
ait for Santa—make your own test,
ncel the invoice if DIE SLICK's not best.

With acknowledgements to G. W. Smith & Sons, Inc., Ohio

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Personal

Mr. T. H. Badnage, secretary of Alfred Herbert, Limited, has been elected a director.

Mr. A. J. Webster has been appointed a director of the London Aluminium Company, Limited.

Mr. Dennis Moreton has been appointed sales manager of the Villiers Engineering Company, Limited, Wolverhampton.

Mr. E. R. Evans, a member of the staff of the British Cast Iron Research Association, has been elected a Fellow of the Institution of Metallurgists.

Dr. A. M. Sage, b.sc., development manager, Alloys Division, of Union Carbide Limited, London, W.1, has been elected a Fellow of the Institution of Metallurgists.

Mr. D. N. Steeley has been appointed sales manager of standard industrial motors at the engineering works of the General Electric Company, Limited, in Birmingham.

Mr. N. C. Macdiarmid, managing director of the Stanton Ironworks Company, Limited, has been elected a director of Stewarts and Lloyds, Limited, the parent company.

Prof. K. G. Denbigh, Professor of Chemical Technology at Edinburgh University, has been appointed to the Chair of Chemical Engineering Science tenable at the Imperial College of Science and Technology, from October 1, 1960.

At the annual general meeting of the Gray Iron Founders' Society, Mr. Albert M. Nutter was re-elected president; Mr. J. E. Quest, vice-president and Mr. C. R. Garland, hon. treasurer. A new election is that of Mr. Robert W. Wilder.

Mr. P. A. Crooke is leaving his present position with Fairey Aviation Company, Limited, to take up a new appointment as technical manager of the precision foundry at Holbrook Steelworks of Samuel Osborn & Company, Limited, Halfway, Sheffield.

Sheepbridge Stokes, Limited, of Chesterfield, Derbyshire—a member company of the Sheepbridge Engineering Group—announce the appointment of Mr. J. C. Morton as their technical representative in the north and east area from Lincolnshire to the Scottish border.

Mr. C. R. Wheeler has been appointed chairman of the Guest Keen Iron & Steel Company, Limited, a subsidiary of Guest Keen & Nettlefolds, Limited. He succeeds Mr. K. S. Peacock, who owing to pressure of other commitments has retired from the chairmanship but remains on the board.

Mr. J. H. E. Heale, who has been works manager at the Motherwell works of Metropolitan-Vickers, Limited, for the past five years, has received an appointment with A.E.I. (Woolwich), Limited, as from January 1. He has been with the former company for 30 years, 12 of which have been spent at Motherwell. His successor will be Mr. E. Campbell, instrument and meter division, Trafford Park Works.

First appointment in the newly-established UK Operations organization of Massey-Ferguson, Limited, is that of Mr. Lionel Harper, a member of the board of Massey-Ferguson Holdings, Limited, who has been appointed assistant managing director of the new group. Mr. Harper has been associated with the company's development in Britain since 1937 and for the past seven years has been managing director of Massey-Ferguson *(Great Britain)*, Limited, the company now being *absorbed in* setting up the new group.

Machine-tool Research ?

During the course of the debate on Government plans to enhance the role of science in industry and increase the use made of research, a number of criticisms were made of the lack of research in the machine-tool industry. Mr. Anthony Greenwood (Lab.) thought that the position of the industry in a period of increasing automation ought to be receiving the most urgent attention of the Minister for Science.

Mr. Austen Albu (Lab.) said there had been some very alarming reports recently about the backwardness of a number of industries—machine tools, textile machinery, and shipbuilding—in the use of scientific methods. Last year the British machine-tool industry recruited two graduates whereas the German industry recruited 500.

Did the Minister of Education really feel that with his natural concentration upon his own job as Minister of Education, he was in any way qualified to argue with members who felt strongly about the DSIR report on machine tools? asked Mr. Frederick Lee (Lab.).

Replying, Sir David Eccles, Minister of Education, said that no detailed charges had been made that not enough research was being done by the machine-tool industry, but the criticism was very insistent. The DSIR had secured the co-operation of 40 of the leading firms in the industry in carrying out a complete but confidential inquiry. It was not a question of putting an industry in the dock, but of getting its fullest co-operation so that things could be put right. The DSIR report was now being discussed with the industry and action was likely to follow.

ICI's Beryllium Plant

Powdered beryllium is potentially dangerous to the lungs and elaborate precautions to keep atmospheric contamination down to a safe level have been taken by Imperial Chemical Industries, Limited, at its new wrought beryllium plant—the first in Europe—which has just come into operation. More than 200 workers are employed in two shifts at the £1,000,000 plant to produce 7 tons a year of the metal, which is valued at about £160 a lb.

There are no windows in the operative section of the plant and the air is filtered, heated, and exchanged every three minutes. Everyone in the contact area wears protective clothing, including breathing apparatus. Every week 3,000 air samples are taken to ensure that the presence of beryllium does not exceed 0.01 microgrammes per 100 cubic metres of air.

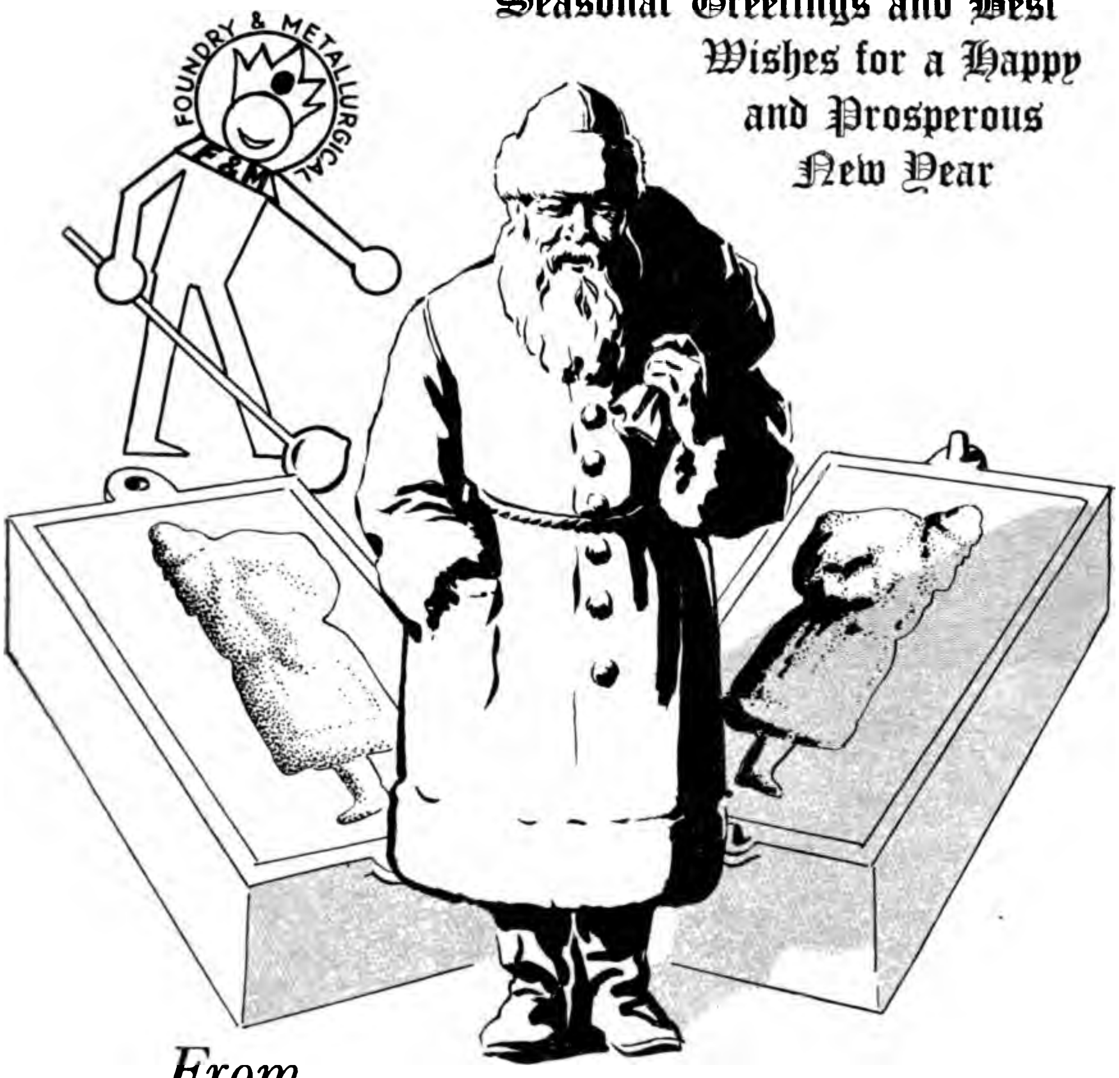
ICI has spent more than £10,000,000 on developing "new" metals—a new titanium plant having a capacity of 2,000 tons a year.

Institution of Works Managers

The increase in corporate membership and plans for doubling the present membership during the next four years, has led to the decision to create a new regional structure, it was announced at the annual general meeting of the Institution of Works Managers on November 27. The first two regional boards will be for the North and South of England; in due course a third for the Midlands will also be established, and later on there will be others. The boards will act as additional liaison between the branches of the Institution and the head office, and will deal with those matters which are of mainly regional interest. Five years ago there were five registered students taking the Institution's courses in works management, this number has now increased to 500. This year more than 100 were successful in the qualifying examinations.

To all our Friends—

Seasonal Greetings and Best
Wishes for a Happy
and Prosperous
New Year



From

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Company News

CONSETT IRON COMPANY, LIMITED—A 3 per cent. interim dividend is declared for the year to March 29, 1960. For the six months to end-March there was a 3 per cent. interim and a final of 1⅜ per cent.

SPERRYN & COMPANY, brassfounders and finishers, etc., of Birmingham—The board is negotiating for more manufacturing space at the Birmingham works and orders have been placed for extra plant. The chairman, Mr. G. N. Sperryn, says that this, with the turnover increase, needs additional capital, which up till now has been met from group resources.

WRIGHT, BINDLEY & GELL, LIMITED, engineers and brassfounders, of Birmingham—In addition to maintaining its dividend at 6d. per 2s. 6d. share, for the year ended September 30, 1959, the company announces a special distribution out of investment profit of 4d. per share (nil) and proposes a one-for-one scrip issue. Group net profit is £23,766 (£47,958).

BRIGHTSIDE ENGINEERING HOLDINGS, LIMITED—For the year to September 30, 1959, there is a final dividend of 14⅜ per cent., making 17½ per cent. on doubled capital, against an equivalent of 20⅝ per cent., including a bonus equivalent of 5 per cent. for 15 months. There was a group net surplus of £418,136 (£563,321 for 15 months), after tax of £424,787 (£380,874 for 15 months).

CROMPTON PARKINSON, LIMITED, manufacturing electrical engineers, of Guiseley (Yorks)—Mr. A. Parkinson, chairman, told the annual meeting that he believed there would be a general increase in demand during the current year but that the company would be faced with intensified competition in many of those traditional fields from which it normally derived the principal part of its income.

STEEL & COMPANY, LIMITED, marine, heating and ventilation, and mechanical-handling engineers, etc., of Sunderland—The directors propose to create 4,000,000 ordinary 5s. shares and to capitalize £500,000 in a one-for-two scrip issue. Profits to date are lower than those of the same period last year. The directors expect that the interim dividend will be maintained at 10 per cent. on the increased capital. The total for the year to March 31, 1959, was 20 per cent.

JOHN I. THORNYCROFT & COMPANY, LIMITED, marine engineers, founders, transport equipment makers, etc., of London, S.W.1—Lt.-Cmdr. J. W. Thornycroft, deputy chairman and managing director, stated at the annual meeting that since the chairman's statement was circulated a substantial order had been received for Mighty Antars for Pakistan and some orders for oil vehicles from North Africa. The position was therefore somewhat better than indicated in the statement.

VERITYS, LIMITED, manufacturing electrical engineers, of Birmingham—The liquidator states that the realization of the company's assets which has been made will enable him in the near future to make an interim distribution to general creditors of the company of 13s. 4d. in the £. So far as he can ascertain at present, after making this distribution and paying the preferential creditors in full, he will not be able to make a final payment of more than 4s. in the £ to the general creditors. In these circumstances there will be a deficiency, so far as the creditors are concerned, and nothing will be available for distribution among the members of the company.

THOS. FIRTH & JOHN BROWN, LIMITED—As forecast *at the time of the one-for-four scrip issue, the company announces a final* dividend of 6 per cent. on the increased capital, which makes the equivalent of 9¼ per cent. for the year ended September 30, 1959, against 8 per cent. Consolidated profit is lower at £4,275,066 (£5,060,293) after deducting £792,477 (£796,586) for depreciation and debenture interest and including investment income of £498,902 (£449,146). The balance after UK tax is £2,317,280 (£2,448,570), to which is added £350,000 (nil) unrequired tax.

Offer for the whole of the ordinary capital of **BROWN BROS. & COMPANY, LIMITED**, Edinburgh, hydraulic and marine engineers, on behalf of a consortium of shipbuilders has been accepted in respect of more than 90 per cent. of the ordinary shares and has become unconditional. The ordinary shares are not quoted. Members of the consortium are:—John Brown & Company (Clydebank), Limited; Cammell Laird & Company, Limited; Fairfield Shipbuilding & Engineering Company, Limited; Harland & Wolff, Limited; Swan, Hunter, & Wigham Richardson, Limited, and Vickers, Limited.

WHITEHEAD IRON & STEEL COMPANY, LIMITED—As forecast, the company is maintaining the 25 per cent. dividend with a final of 15 per cent. for the year ended October 3, 1959. Group profits, before tax, amount to £924,376, against £1,204,721. After a much reduced tax charge, the group's net income balance is higher at £605,317 (£587,503). The directors state that the figures confirm the forecast made in June, when the interim dividend was declared. The favourable trading results from June, 1959, onwards arising from full working time have offset the reduced profits in the earlier months of the year and have enabled the board to "show a very satisfactory result for the full year."

Board Changes

CHARLES CHURCHILL & COMPANY, LIMITED—Mr. G. E. K. Blythe has ceased to be a director.

JAMES H. DENNIS & COMPANY, LIMITED—Mr. G. J. H. Dennis has resigned as a director.

PETROFINA (GREAT BRITAIN), LIMITED—Mr. E. Roberts has been elected a director. He has been general sales manager since 1949.

UNIVERSAL GRINDING WHEEL COMPANY, LIMITED—Sir Samuel Beale has decided, in deference to his age, to retire from the chairmanship, although he will remain a director.

HIGH PRECISION EQUIPMENT, LIMITED—Mr. D. E. Greenaway and Mr. W. J. Bonner have been appointed directors of the company, a subsidiary of Associated Engineering, Limited.

GAS PURIFICATION & CHEMICAL COMPANY, LIMITED—Mr. G. S. Taylor, chairman and managing director of Grundig (Great Britain), Limited, a subsidiary company, has been co-opted to the board.

Recent Wills

ROBINSON, J. A., of Mansfield (Notts), retired ironfounder	£19,768
GILLIES, J. S., formerly outside manager of William Doxford & Sons (Engineers), Limited, Sunderland	£1,666
PEARSON, THEOPHILUS, chairman of Pearson & Company (Chesterfield), Limited, manufacturers of firebricks and refractories	£46,998
LANDELS, T. A., principal of T. A. Landels & Sons, Limited, engineers and millwrights, of Berwick-upon-Tweed (Northumberland)	£8,153
CATTO, LORD, Governor of the Bank of England, 1944-49, and a director of the International Nickel Company of Canada, Limited, until 1940, when he became financial adviser to the Treasury ...	£501,805

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If you have Dallow Lambert unit dust collectors in your factory, you can make sure they stay as efficient as they were the day you bought them by taking advantage of our Maintenance Service Scheme. This scheme, for which we make a small charge, provides for a service engineer to come round at least twice a year and thoroughly inspect your dust control equipment, making any repairs and replacements that may be necessary. This ensures that the equipment will continue to collect the dust produced by your machines, so that they can run with maximum efficiency and safety. It will also help to satisfy H.M. Inspector of Factories that you are doing your best to safeguard the health of your workers.

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For the attention of

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CRC 86

Publications Received

Survey of "C" Licensed Vehicles. Published by the Traders Road Transport Association, 146, New Bond Street, London, W.1; price 2s.

This 40-page well-documented Report covers the activities of 98,340 commercial vehicles. Probably the most important information given is set out in Table III, which details the reasons for using "C" licensed vehicles in preference to hired road haulage and rail transport. From this table it would appear that the underlying precept governing the choice of "C" licensed vehicles was giving real service to the customer; reduction in pilferage was another factor. In one case, the reviewer has been told, one company claims more from the railways for loss of goods than it pays them for transport, so, for certain classes of goods, loss by theft must be an important overall factor. Packaging costs too are stated in many cases to be reduced. All these facts are well known to British Railways and in common fairness it should be said that they are making strenuous efforts to make more efficient the services they give.

Raising Productivity in Smaller Firms. Published by the British Productivity Council, 21, Tothill Street, London, S.W.1; price 2s. 6d.

This booklet contains a dozen reports of an investigation into various aspects of firms, employing from six to 250 people, by the staff of the National Union of Manufacturers' Advisory Service, Limited (York Buildings, Adelphi, London, W.C.2). The reports deal with a number of activities ranging from plastics to small-scale floriculture, but no foundry investigation is included.

Metal Industries, Limited. Who we are, and what we do. Issued from Brook House, Park Lane, London, W.1.

Each page of this booklet is devoted to one of the companies in the Metal Industries group. They are treated alphabetically and often an illustration is incorporated to show a shop, a plant or a production. The ladle shown in the first picture looks a little the worse for wear! It is very useful to have this type of book showing the ramifications of a large industrial enterprise.

This is TI To-day. Published by Tube Investments, Limited, Adelphi, London, W.C.2.

This is a directory of the TI "empire," covering the activities of 52 companies, a number of special departments, and 18 overseas subsidiaries. It is a very useful publication as it is often difficult, even for those quite well versed in industrial matters, to remember the current "parentage" of firms though their names may have been familiar for many years.

Tiona V for Vitreous Enamels. Issued by Laporte Titanium, Limited, Hanover House, 14, Hanover Square, London, W.1.

This is technically a very interesting booklet as much information is given as to formulation of the enamel, reflectances, and colour. Especially useful are the cardinal points set out on pages 10 and 11 for enamel formulation.

Information Sheet, Series C Leaflets. Published by the Staveley Iron and Chemical Company, Limited, near Chesterfield.

This series of leaflets covers the application of Orthosil alkali chemical immersion cleaners. The cleaners are based on anhydrous sodium orthosilicate, Na_4SiO_4, and the various formulations are designed for use in vitreous enamelling, electroplating, phosphating, galvanizing and general engineering.

House Organs

Aluminium Courier, No. 47. Published by
Aluminium Development Association, 33,
venor Street, London, W.1.

This issue is quite topical, as its appearance ro
coincides with the opening of the M.1 motor roa
the main articles deal with road signs and fur
One picture, that of a road sign in Park Lane, L
is a good illustration of exactly how " not to do th
for the sign is placed just before a pedestrian cr
which should take priority for drivers' viewpoi
attention. However, there is no fault in the sign
it is its siting by the Local Authority which the re
criticizes. The competition, organized by the A
tion for a design of lighting standards (recentl
scribed in the JOURNAL), is also fully covered by d
tion and drawings. Altogether this issue is
produced and extremely interesting.

Ruston Review and Paxman News. Issued qua
by the Ruston Group, Lincoln.

The reviewer was fascinated by the descripti
this magazine of "Europe's Largest Sewage P
actually the London County Council works at Be
Essex, which caters for 3,000,000 people living
area of 112 square miles. For the operation of
Ruston's supplied eight gas turbines running on
gas and were the main contractors for the whole
Another interesting story in this issue is that o
water supply for the city of Dar-es-Salaam, t
success of which Ruston plant very largely c
buted. Altogether this is a very interesting public

Pulse, Vol. 1, No. 1. Published by Kelvin & H
(Industrial), Limited, Wembley Park Drive,
bley, Middlesex.

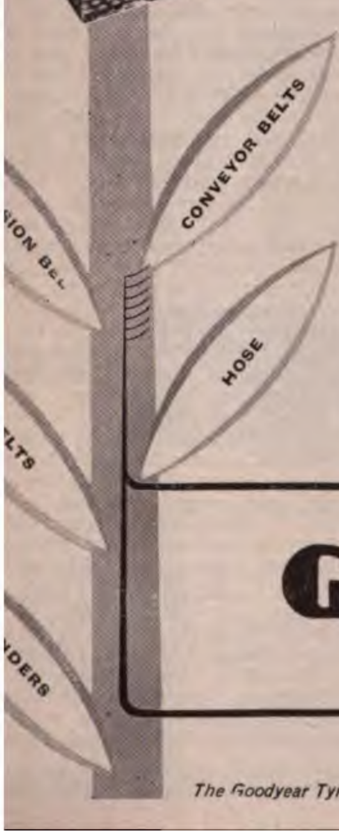
No indication is given as to whether this inter
new magazine is to be published monthly or quar
It covers subjects which are demanding incre
attention by foundry interests, those of non-destr
testing and electronic instruments. Whilst most o
readers are familiar with the use of ultrasonic
testing for defects in welds and castings, it will co
a surprise that this medium is also used for ascerta
the amount of fat carried by breeding-pigs.

The Electric Tool User (Autumn, 1959). Publish
Wolf Electric Tools, Limited, Pioneer W
Hanger Lane, London, W.5.

This magazine is designed to interest the read
the multifarious applications in industry of el
tools. Thus its contents comprise short illust
articles—ten in all—which cover the usefulness o
tools, *inter alia,* in mines, rolling mills, shipyards,
on the farm. The magazine is available to reade
writing to Pioneer works.

HUNGARY IS PLANNING to raise steel production
1,600,000 metric tons in 1958 to an annual outp
2,400,000 tons in 1965—the end of the country's s
five-year plan. Ironworks at Duna are to receive a
Martin furnace and the Ozd steel plant is to be
modernized.

STEEL, PEECH AND TOZER, of Rotherham (a b
of the United Steel Companies, Limited), are to
£10,000,000 on the replacement of all their ex
open-hearth steel-melting furnaces by six electri
furnaces of 110 tons capacity each. It is said
when completed in about five years' time, it will b
largest electric steelmaking plant in the world
an annual capacity of 1,350,000 ingot tons of
It is the largest single development scheme in
branch's 80-year history.



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- Substantial edge cover to resist wear

GOODYEAR

THE GREATEST NAME IN RUBBER

The Goodyear Tyre & Rubber Company (G.B.) Ltd., Industrial Rubber Products Dept., Wolverhampton

Raw Material Markets

Iron and Steel

Outputs of most grades of pig-iron are maintained at satisfactory levels. The expansion in demand for basic steelmaking pig-iron has been met by increased production and the steelworks continue to receive sufficient supplies both for consumption and stock requirements. In the foundry grades high-phosphorus irons are the most easily obtainable, producing furnaces being well able to satisfy the needs of the foundries using these grades either from stock or current outputs.

The light foundries producing castings for the domestic utensil and the building trades maintain an improved demand for pig-irons and these foundries are able, with the work on hand, to obtain reasonably good outputs of castings. Many of the jobbing foundries are fairly well occupied, but the textile foundries are only moderately busy. On account of the easy supply position of the high-phosphorus irons there is little forward buying, current business covering only immediate consumption and working stock requirements.

For the engineering and speciality foundries producing those high-quality castings which necessitate the use of low-phosphorus irons, the present supply of these grades is not so easy. The heavier demands made on the furnaces for supplies, chiefly from the makers of castings for the motor vehicle trade, are, for some brands, in excess of available supplies, of which only a limited quota can be obtained. In consequence, other producers are booking more heavily and so far have been able to cope with the increased business. Delivery dates, however, have been extended.

It is expected that additional furnace capacity for the production of low-phosphorus irons will be available in the early part of next year when the supply position should be easier, and, with this in view, many foundries are covering for their needs for some months ahead. A fresh furnace producing low-phosphorus iron in the Derbyshire area is also expected to go into commission shortly.

In addition to the heavy demands for castings from the motor-car trade, the machine-tool industry is also specifying for castings more freely, and the foundries catering for them are obtaining much better outputs. A substantial tonnage is also being taken up by many other users of high-duty castings, but from collieries and railways demand continues moderate. Apart from the low-phosphorus irons, good quantities of hematite are also being taken up by the engineering foundries, so that makers of this iron are much busier. Refined iron makers are also disposing of larger tonnages of pig-iron.

There is a heavy demand for arisings of both steel and cast-iron scrap and suitable parcels are readily accepted. Foundry coke deliveries are satisfactory and ganister, limestone, and firebricks are available to requirements.

With their present order-books the re-rollers are very well employed and are obtaining good outputs of small bars and light sections, together with reinforcing rods. Demand is maintained at high levels, enabling the mills to operate on a full-time basis. The call for steel semis is substantial and home steelworks are fully committed for their outputs for some time ahead. Here again delivery dates are extended. All arisings at the steelworks of suitable re-rolling quality *defectives and* crops are readily accepted by the re-

Non-ferrous Metals

The US strike position still dominates the copper markets on both sides of the Atlantic, but in a different way than previously. The American Smelting & Refining Company and the Mine, Mill and Smelter Workers' Union have reached agreement on local issues, as a result of which 11 of Asarco's plants have resumed operations. Furthermore, negotiations with Kennecott are reported to be going well. Nothing has been heard of Phelps-Dodge and Anaconda, but this does not really matter because if Kennecott comes to terms the rest of the producers will fall in line.

What will happen to the price of copper in London? This is a more difficult question to answer now than a week ago because, then, it appeared that the longshoremen would come out on strike so that no copper could be shipped to the United States to relieve the shortage. Now, the longshoremen's strike is virtually settled, so that a fair demand for copper from London could build up while the US copper mines are getting back into their stride. If this is reasonable, then it is also reasonable to conclude that the price fall will not be so sharp as it would have been. However, the Christmas holiday period is a slack time and demand naturally falls away and so it must be concluded that the copper price in London will take some time to recover its recent high price levels. Anyway, demand is satisfactory both from the UK and from the Continent and once the US copper producers and custom smelters can sell and buy metal, market prices—as between London and New York—can be put on a realistic basis. As the moment, US producers are quoting 33 cents with no copper to sell, and custom smelters are still unquoted.

Tin is an unsettled market in London and weak in both America and in the East. The fact is that the market has not quite made up its mind about the Tin Council's decision to raise the next quota by 6,000 tons to 36,000 tons. Moreover, this news was followed last week by the statement that the buffer stock would not be holding less than 10,000 tons of tin by the end of this year. Meanwhile, and up to the end of June, 1960, the buffer stock manager can operate in the market between £780 and £830 a ton. At the end of the next June the council will be considering a new draft agreement, as the present one expires on June 30, 1960. Singapore is weak, with the price fluctuating sharply. This has had its effect on the London market, which is, at best, only quietly steady. In the US demand is patchy, but better, and the price is trying hard to rise to $1 a pound.

Lead remains lifeless on both sides of the Atlantic and stocks are substantial. The US price (New York) is now 12.50 cents a pound, against 13 cents previously. The East St. Louis price is 12.30 cents, against the previous 12.80 cents.

Zinc prices in London on Monday were sharply depressed by a market rumour that a further release of Board of Trade metal was likely. Earlier, zinc had continued steady with overall demand satisfactory. The US market is steady and waiting for further developments from the steel industry negotiations. The US price is called 12½ cents a pound, East St. Louis.

NEGOTIATIONS ARE proceeding between Elliott-Automation, Limited, London, W.1, and Manufacture de Machines Du Haut-Rhin, SA ("Manurhin"), Mulhouse, France, with a view to the manufacture in France of Elliott-Automation equipment. It is proposed that Elliott-Automation will take a financial interest in Manurhin.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

December 15, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron). Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 10s. 0d. to £44 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 0s. 0d. to £62 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £78 10s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £77 0s. 0d. to £80 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10¼d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

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Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

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Copper Tubes, etc.—Solid-drawn tubes, 2s. 5½d. per lb.; rods, 275s. 6d. per cwt. basis; 20 s.w.g., 310s. 6d. per cwt.

Tin.—Cash, £787 10s. 0d. to £788 0s. 0d.; three months, £781 10s. 0d. to £782 0s. 0d.; settlement, £788 0s. 0d.

Lead (Refined Pig).—First half December, £71 15s. 0d. to £71 17s. 6d.; first half March, £71 10s. 0d. to £71 12s. 6d.

Zinc.—First half December, £96 0s. 0d. to £96 5s. 0d.; first half March, £90 10s. 0d. to £90 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £132 5s. 0d.; rolled zinc (boiler plates), all English destinations, £130 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0½d. per lb.; sheets to 10 w.g., 224s. 3d. per cwt.; wire, 2s. 10½d.; rolled metal, 224s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, — ; B6, — .

Brass (High Tensile).—BS1400, HTB1, — ; HTB2, — ; HTB3, — .

Gunmetal.—BS1400, LG2, — ; LG3, — ; G1, ½%, — ; G1, 1%, — .

Phosphor Bronze.—BS1400, PB1 (AID released), — ; BS1400, 90/10/1, — .

Leaded Phosphor Bronze.—BS1400, LPB1, — .

Phosphor Bronze Strip, etc.—Strip, 313s. 9d. per cwt.; wire, 4s. 3¼d. per lb.; rods, 3s. 6¾d.; tubes, 3s. 6¾d.; chill cast bars; solids 3s. 6¼d.; cored 3s. 7¼d. (Charles Clifford, Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 0d. per lb.; round wire, 10g in coils (10 per cent.), 4s. 5d.; special quality turning rod, 10 per cent., ¼ in. dia., in straight lengths, 4s. 4d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. to £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, — ; AB2, — .

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E

Imports and Exports of Iron and Steel in October

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in October. Totals for the first ten months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended Oct. 31.	Ten months ended Oct. 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Cyprus	96	4,810	1,339
Sierra Leone	626	10,497	8,543
Ghana	1,635	12,832	22,680
Nigeria	9.253	54,521	64,187
Union of South Africa	3,501	80,679	34,095
Rhodesia and Nyasaland	2,270	29,074	17,724
Tanganyika	1,407	12,072	16,648
Kenya	3,898	33,950	21,413
Uganda	245	2,663	3,513
Mauritius	332	2,775	1 420
Aden	503	2,531	2,708
Bahrein, Qatar, and Trucial States	573	7,464	6,557
Kuwait	1,183	35,175	9,153
India	28,819	121,008	167,192
Pakistan	5,749	47,841	36,354
Singapore	1,589	28,399	18,811
Malaya	724	12,851	8,594
Ceylon	1,410	23,473	32,846
British North Borneo	399	1,729	2,269
Hongkong	6,008	47,907	55,360
Australia	8,604	84,312	68,145
New Zealand	10,137	153,737	81,896
Canada	26,475	151,933	175,018
Jamaica	2,076	17,826	18,053
Trinidad	3,621	41,512	34,545
British Guiana	506	5,971	5,473
Other Commonwealth countries	2,792	34,095	29,734
Eire	4,445	40,453	39,883
Soviet Union	7,261	15,967	28,566
Finland	3,932	41,148	30.261
Sweden	14,871	101,464	104,040
Norway	9,240	76,358	77,955
Denmark	9,723	71,369	78,596
Western Germany	11,088	44,100	101,680
Netherlands	9,259	67,313	80,466
Belgium	2,976	30,601	30,948
France	2,509	3,747	5,041
Switzerland	656	8,023	7,313
Portugal	1,198	11,815	12,808
Spain	2,280	38,028	23,734
Italy	2,171	35,468	40,048
Austria	799	8,491	3,444
Yugoslavia	1,667	3,440	4,281
Greece	1,370	11,271	9,608
Turkey	239	3,778	4,710
Netherlands Antilles	963	1,762	2,955
Portuguese East Africa	75	2,233	1,251
Egypt	1,058	11,793	3,208
Sudan	386	29,618	6,101
Lebanon	685	8,636	3,054
Israel	1,013	6,548	12,312
Saudi Arabia	83	3,665	2,949
Iraq	11,255	31,491	69,325
Iran	9,186	33,012	32,439
Burma	925	9,671	7,582
Thailand	939	5,937	7,235
Indonesia	1,824	1,759	5,877
Philippine Republic	610	2,999	6,759
USA	25,552	69,534	159,307
Cuba	904	5,238	6,140
Colombia	932	5,072	3,705
Venezuela	4,133	58,903	58,428
Ecuador	37	2,158	848
Peru	219	9,183	2,223
Chile	173	4,348	1,236
Uruguay	721	824	1,492
Argentina	18,819	112,257	180,737
Other foreign countries	65,703	107,326	279,643
TOTAL	356,310	2,198,438	2,482,458

DAMAGE estimated at about £200 was caused when fire broke out at the premises of H. E. Lupton and *Sons, Limited*, ironfounders, Accrington, Lancs, last *month*.

Total Imports of Iron and Steel

From	Month ended Oct. 31.	Ten months ended Oct. 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	357	5,627	4.413
Canada	2,145	18.304	15.452
Other Commonwealth countries and Eire	4,860	19.674	31.675
Soviet Union	2,411	108.929	44,448
Sweden	3,621	29,600	24,953
Norway	9,120	59,799	71,389
Poland	439	173	4,102
Western Germany	9,051	61,807	62,882
Netherlands	12,192	119,250	134,696
Belgium	2,213	86,282	19.116
Luxembourg	623	5,784	5,536
France	1,839	16,721	18,231
Italy	655	6,780	[illegible]
Austria	319	3,746	3,476
Japan	50	2,996	2.008
USA	1,126	114,878	20,739
Other foreign countries	636	6,852	9,811
TOTAL	51,657	667,202	484,545
Iron and steel scrap and waste, fit only for the recovery of metal	49	61,758	[illegible]

Exports of Iron and Steel by Products

Product.	Month ended Oct. 31.	Ten months ended Oct. 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Pig-iron	13,540	120,743	[illegible]
Ferro-columbium (niobium)	16	31	55
Ferro-tungsten	131	629	1,000
Other ferro-alloys	1,199	2,991	7,202
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	11,479	12,889	71,573
Pieces roughly shaped by forging*	156	6,188	1,342
Iron bars, rods, angles, shapes, and sections	1,612	1.467	3,177
Steel bars, rods, angles, sections, and shapes	82,942	270,858	[illegible]
Iron plates and sheets	1,251	1,383	[illegible]
Universal plates	1,066	3.574	[illegible]
Steel plates, 3mm. and under 4.5mm. thickness	3,634	7,021	[illegible]
Ditto, 4.5mm. or more in thickness	27,631	146,626	[illegible]
Blacksheets and blackplate	30,500	233,544	[illegible]
Hoop and strip	7,521	62,626	[illegible]
Tinplate	39,118	307,795	[illegible]
Decorated tinplate	785	3,564	[illegible]
Galvanized sheets	6,935	65,722	[illegible]
Other (incl. tinned sheets, terneplate, and ternesheets)	3,064	11,363	[illegible]
Railway and tramway construction material	24,468	202,404	140,835
Wire rods of steel (incl. alloy steel)	5,198	39,425	41,135
Wire	10.429	84,066	88,655
Tubes, pipes, and fittings	83,635	613,529	604.746
TOTAL	356.310	2,198,438	2,482,458

* The figures for 1959 are not completely comparable with thos for previous years.

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FOUNDRY TRADE JOURNAL

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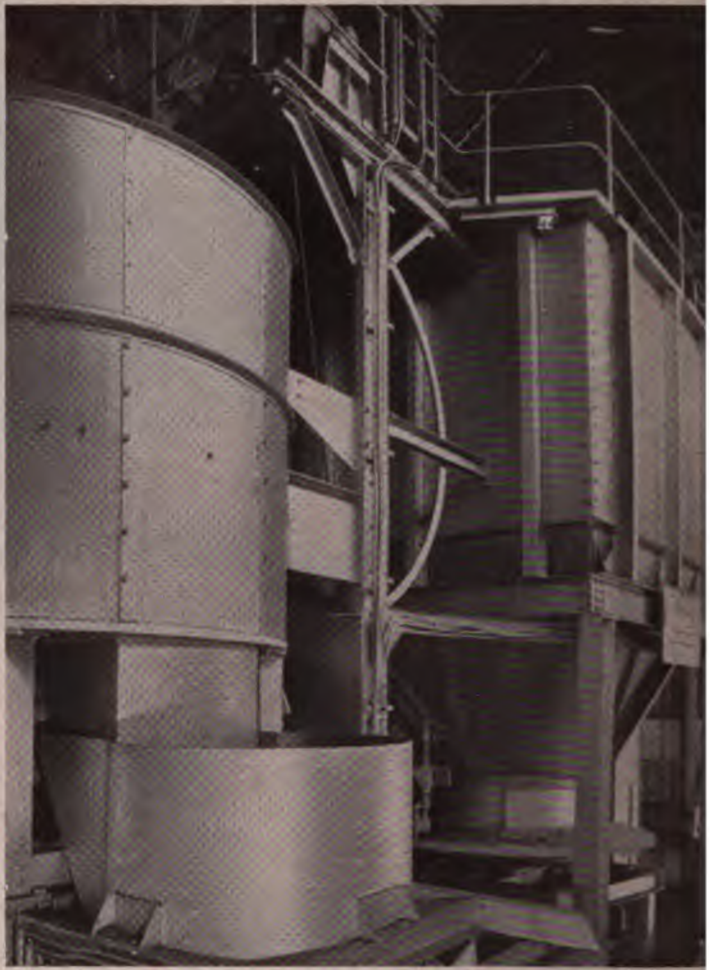

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FOUNDRY
TRADE JOURNAL
Vol. 107 DECEMBER 24, 1959 No. 2246

New Export Service Bulletin

Each morning, we receive from the Export Services Branch of the Board of Trade, several wads of cyclostyled documents carrying the captions: " Call for Tenders ", or " Export Opportunities ", or " Economic Report ". Only a very small proportion of these—covering as they do the whole field of commerce—is of even indirect let alone direct interest to the foundry industry. Yet as a whole they are of outstanding importance. However, the service in its present form is alike wasteful of paper and time and, wisely, the Board of Trade has decided to discontinue it on January 1. It is to be replaced by a tri-weekly *Export Services Bulletin*, designed to economize in time and material; the cost to recipients is to be increased to £10 from the old figure of £2 10s.

The services rendered by the Board of Trade are widely recognized as being of an exceptionally high order and are the envy of foreign businessmen. Yet we doubt if they are appreciated by U.K. foundry owners because, in their view, the operations seem to be too remote from actual day-to-day trading. Some of the overseas enquiries listed by the Board are of such small value that they query the wisdom of passing them through the Government machinery. To go from the general to the particular, we recall how there was once issued an enquiry from a large gas-cooker foundry for an odd ton or two of special pig-iron, probably for experimental purposes. As a result of its reaching a large number of pig-iron suppliers, about ten travellers in ten cars called on the concern and whilst perhaps the firm booking the order broke even, yet there was no doubt a loss to the industry as a whole. We are obviously unaware how much it costs to put out each Board of Trade call for tenders, but to our mind, unless they result in a firm or firms breaking into a new market, any having a profit value less than £100 cost the country as a whole more than the inquiry is worth.

Firms should use the services of the Board of Trade much more than they do. If a regular line of exports is vanishing, there is every reason why this should be brought to the Board's notice. If overseas representation is sought, advice from the BoT can be invaluable, for this is a most difficult problem. In plain English, no private firm has anything like the world-wide commercial coverage as that which has been organized by the Board of Trade, through the various Embassies and Consulates. We used their services for reports on the export possibilities of engineering patterns and received reports from a number of industrial centres overseas. They carried the warning that " on the spot " last-minute alterations to design was the major stumbling block to overseas business of this nature. As soon as we receive the new *Bulletin*, a review will be made as to its potential value to readers.

BSFA Banquet

EXTRACTS FROM SIR LESLIE ROWAN'S SPEECH

It is only rarely that after-dinner orations carry a serious tone, but at the banquet of the British Steel Founders' Association, held on December 2, the speech by Sir Leslie Rowan was of outstanding importance. As a Treasury official, as Economic Minister at the British Embassy, Washington from 1949 to 1951, and now as a director of Vickers, Limited, his record is such as to give much weight as to his pronouncements. He had been asked to deal with the future of the steelfounding industry during the next 25 years, and based his thoughts on the fact that 50 per cent. of the production of steelfounders was either directly, or indirectly, exported. Thus, the future was bound up with the ability to export. To put this figure into perspective, he pointed out that during the decade before the war, the figure was but 20 per cent., whilst in 1958, it was 43 per cent. Another important pointer was the direction of international trade, and continuing with the comparison with pre-war days, exports to USA, Canada and to the rest of the sterling area have increased by 4 per cent. each. Where losses have taken place, they have been to those countries outside Europe, where in recent times, there has been the greatest increase in exports.

Sir Leslie insisted that there had been a quite different outlook by Governments during the period under review. In the 1930's, the attitude was protectionist and restrictive, whereas to-day, it was one of liberalization and freedom. This country, he said, lived on exports, but they were "postponed exports." People could not postpone the buying of bread and meat, but they could put off buying machine-tools and industrial plant, and this fact placed this country in a different category from most. Not an economic, but a political issue and one which exercised a banal influence on British trade was the India/Pakistan dispute over Kashmir. That dispute was more likely to be settled through the good offices of the International Bank than by any other single institution.

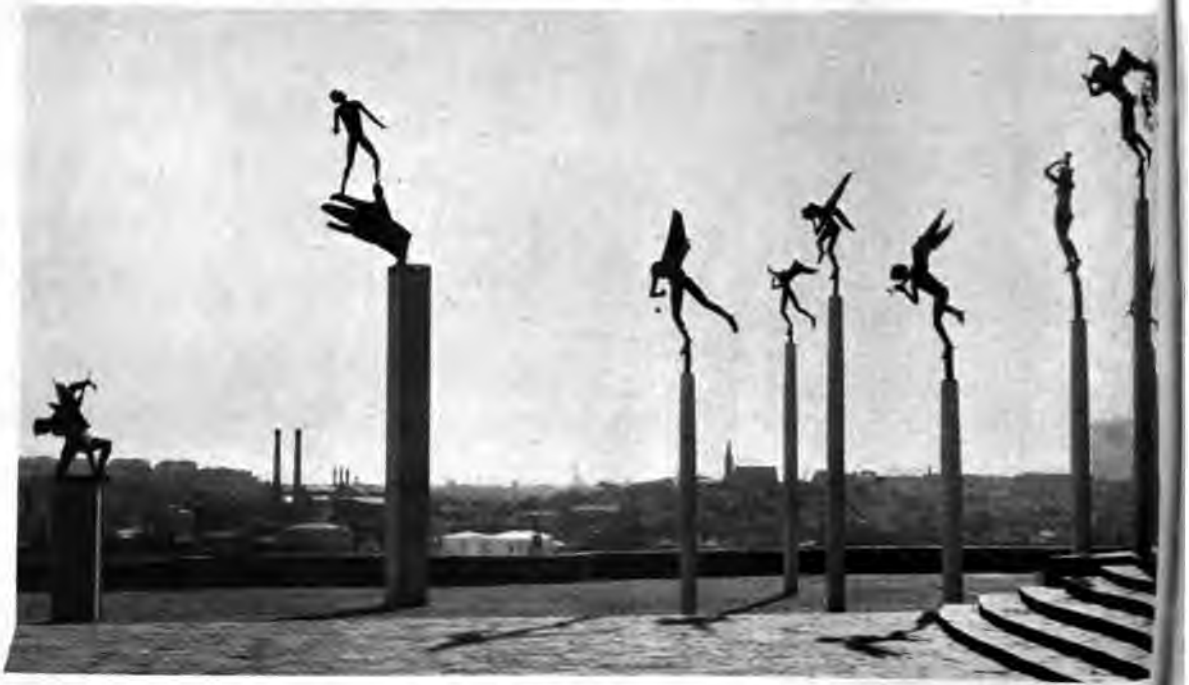
Whilst the overall picture of increased exports appeared to be favourable, yet it was not entirely rosy, and in this connection, there were three factors. They were: The attitude towards trade; international cooperation, and the maintenance of a high level of employment. The outcome of the divisions now being created between the six- and seven-nation treaties, Sir Leslie also described as not being too rosy, as too little account was being taken of the two transatlantic powers, Canada and USA. Attention must be given during the next 25 years to competition from Russia and other countries. Finally, the undeveloped countries, he said, would find it difficult to match their natural resources with the ever-increasing populations so as to provide a reasonable standard of living.

AFS Congress and Exhibition

The American Foundrymen's Society announces that the 1960 Castings Congress will be held in Philadelphia from May 9 to 13. With it is to be held an exhibition of foundry equipment at which many new developments will be shown for the first time.

Lighthearted Swedish Sculpture

At Christmastime a certain amount of lightheartedness is permissible even in the most sober of publications, and it is in this vein that the JOURNAL reproduces the picture below—where the sculptor certainly uses an old medium in a new and whimsical manner. These curious metal figures, by Carl Milles, stand in the Milles Garden, Stockholm. [The Editor is indebted to Mr. James Carr for submitting this photograph.]



*Craft Apprentices' Corner**

Use Spinners for Clean, Slag-free Castings . . .

. . . with "Tubal Cain" on the Job!

Talking to a feilow foundryman t'other day, malleable man 'e was, by the way, an' we got on to discussin' slag inclusions in castings. Bein' a malleable founder o' course, this was of particular importance to 'im, an' like so many more malleable blokes 'e preferred the use of a spinner-type slag trap. Seems 'e'd tried other ways an' means, but all the same 'e 'ad to come back to 'is spinner to get good results. Well, I let that pass by 'cos I've a pretty open mind about it meself, tho' I do agree that if it is intelligently used the spinner takes a bit o' beating.

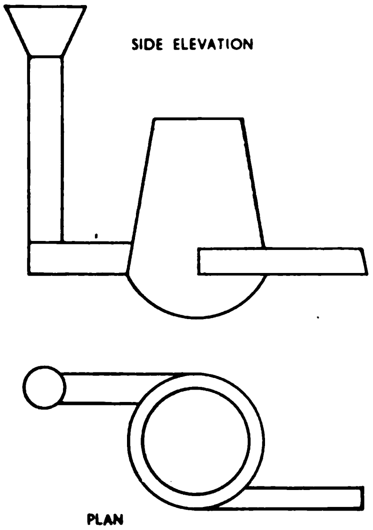


Fig. 1.—*The spinner-type slag trap is positioned between the downgate and the mould cavity.*

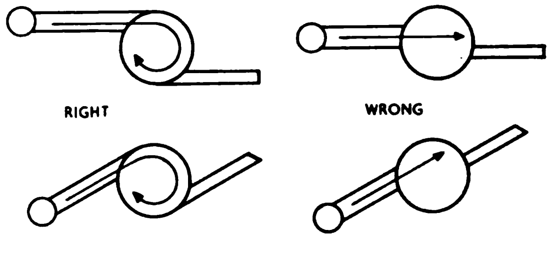
For a spinner to operate properly, . . .

Well now, a bit later on this feller takes to [illegible]inating, chiefly about the historical background [illegible] favourite spinner, an' seems to be a little bit [illegible] about the fact that what has allus been [illegible]d as the malleable founder's own private [illegible]ty has, in recent years, been adopted by a [illegible]elfounders an' a few grey-iron founders. [illegible] nothin' to be peeved about *there*, after all, if it's something that's goin' to be helpful to other founders an' maybe help 'em to produce a better casting he really should be pleased about it! But no—'e only feels contempt for "folks wot ain't clever enough to devise systems o' their own, without 'aving to pinch somebody else's ideas. Shows how clever they are," 'e goes on, "they can't even use the idea properly. Altho' on the whole the steel men seem to do fairly well with it, the grey-iron men don't seem to get very good results." Now I 'ad to agree with this, an' I've run up against quite a few grey-iron founders who have condemned the spinner as being "no . . . . . good, mate," but in such cases I'm pretty sure the answer is simple enough—the spinner just ain't being used intelligently. Let's have a closer look and see what's what.

. . . the metal must enter at an acute angle.

The spinner-type slag trap is placed intermediate between the downgate and the mould cavity, and usually looks something like Fig. 1. The incoming metal (to the spinner) is introduced at a tangent, and the outgoing metal (from the spinner) is taken off, also at a tangent, from the opposite side. The net result is that a whirlpool effect is created in the spinner, and any slag which happens to be present is caught up in the whirling stream, rises to the top, and is retained in the spinning eddy while clean metal passes into the mould cavity. Simple, eh? Right! Why, then, does the spinner often fail to do its work? The reason is that it is not always realized that for the spinner to create an efficient whirling effect, it is essential that the metal enter the spinner at an acute angle, as in Fig. 2, and the same applies, of course, to the outlet.

Fig. 2.—*The metal must enter the spinner at an acute angle, as shown on the left.*



[illegible] is usual in this series, the popular jargon of the [illegible]ry has been retained in some parts of the article. [illegible]ogies are made to translators.—Editor.

Craft Apprentices' Corner

To make the spin fast and effective . . .

There is often controversy as to whether the "ridges" (runner bars, channels, trenches, gullies, call them what you will) should be cut in the cope or in the drag; personally, I think it is unimportant—what *is* important is getting the metal to spin fast and effectively, at the same time throwing the entrapped slag high enough to be well out of the way of the outgoing metal stream, as in Fig. 3.

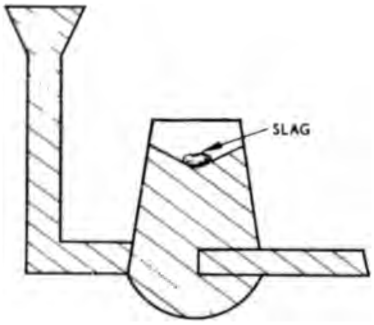
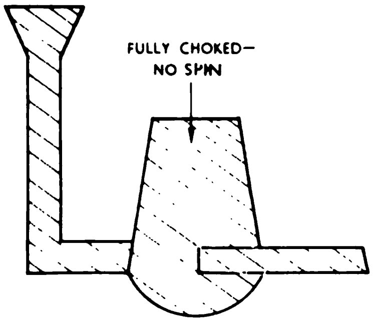


FIG. 3.—*The metal must spin fast enough to throw the slag up out of the way of the outgoing metal stream as shown above.*

In order for the metal to spin fast enough to be at all effective it is obvious that it must have a free upper surface, and this can only be achieved by the correct balance between the cross-sectional areas of the ingoing and outgoing metal streams, and the diameter of the spinner. The ingoing stream should be slightly larger in cross-sectional area than the outgoing one—in this way the system will be slightly (not fully) choked, and the head of metal inside the spinner will have a free surface.



When conditions are such that the spinner is *fully* choked, insufficient spinning action is taking place, and altho' the spinner may trap some of the entrained slag even under these unfavourable conditions, it will certainly not be so effective as it should be. Look what happens sometimes . . .

. . . the metal stream should be *slightly* choked—

Occasionally in the malleable foundry a certain job gives trouble from slag inclusions, and during the subsequent investigations it is decided to test the spinner visually for efficiency. Right. On a specimen mould the spinner is "tubed thro'," that is, it is continued right thro' the cope so that it is open to the atmosphere. The mould is poured, the metal in the spinner creates its whirlpool, the slag whizzes round merrily in the centre of the eddy and everybody is quite happy—until the next day, when the trouble is just as bad as before. Hard luck! Somebody has deluded himself into thinking that the spinner was working efficiently. He has overlooked the fact that, by increasing the height of the spinner, he has given the metal a free-spinning surface, a surface which the closed top of the spinner was previously choking, as is shown in Fig. 4.

. . . grey-iron founders please note!

This is undoubtedly the reason why grey-iron founders often fail to find satisfaction when adapting the spinner to their work. The process of pouring malleable iron is fundamentally different to that of grey iron. The malleable man scorns the use of a pouring basin and pours his metal stream directly into the downgate. His gating system is therefore choked not at the pouring basin, but at the point where the metal leaves the spinner. The grey-iron founder using a spinner for the first time naturally follows his usual practice, and provides his downgate with a generous pouring basin, thereby choking his system completely—result, no spin in his spinner, slag in his castings, and dissatisfaction with the result of his efforts.

Spinner-feeders *can* be effective, . . .

So far, we have considered the spinner simply and solely as a slag trap incorporated in the gating system. However, the underlying principles can also be incorporated into a side-feeder, so that one then has what may be termed a "spinner-feeder." What, then, will the difference in operation be? We know that a side-feeder, to be effective, needs to be of a reasonable size, and that the connecting neck (to the casting) will also have to be fairly large—the neck will certainly be much larger than the ridge leading from the downgate to the spinner-feeder. If what has previously been said about the relationship of these two is correct, then it would seem impossible for the spinner-feeder to be effective. This is not so.

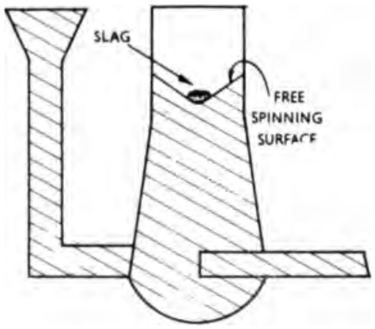
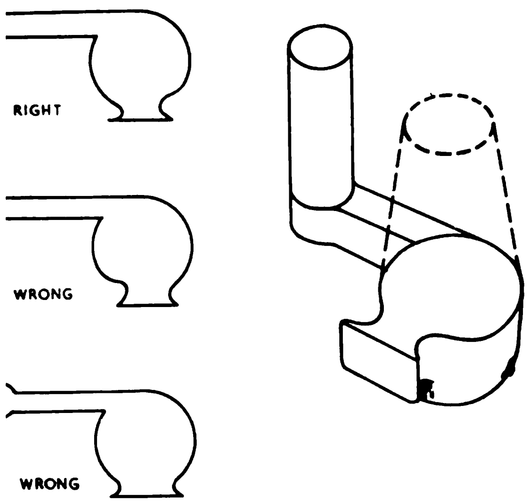


FIG. 4.—*If it is decided to test an open spinner visually for efficiency, care must be taken not to overlook the fact that an increase in spinner height may create a free-spinning metal surface in place of one which was previously choked by the closed top of the original spinner.*



5.—*(right) Perspective sketch of the design of ie-feeder/spinner and its tangential inlet; (right) views of right and wrong ways of moulding sides of the spinner.*

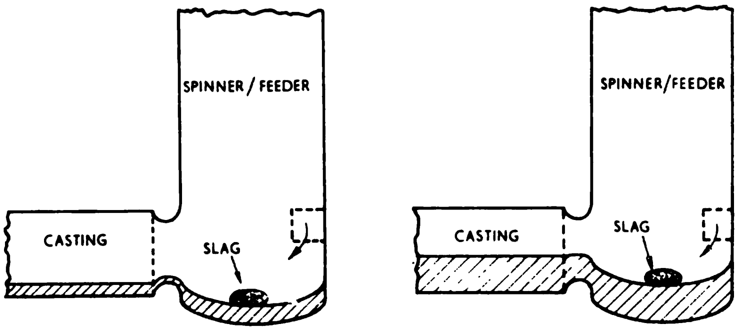
. . . if correctly designed, since . . .

or a spinner-feeder of this type to be effective quires a velocity of metal sufficient to maintain a continuous spin; thereafter the design of the spinner-feeder is the controlling factor. In this case, the base of the spinner-feeder should be fairly deep and well-rounded in order to create spin, and it is perhaps best if the ridge from the downgate is cut in the drag. Attention should be given to the shape of the spinner in the area of the connecting neck—it should not be truly circular at this point and, indeed, requires to be flattened-off somewhat on one side, as in Fig. 5.

. . . spin is created in the feeder " bowl."

When a spinner-feeder of this type is used its mode of operation is rather different from the one previously outlined. Molten metal enters the feeder and spin is immediately created in the " bowl " of the feeder. As the level of metal in the feeder reaches the connecting neck it flows over the lip of this and into the mould cavity. Provided that the velocity of spin is maintained in the feeder, no slag should enter the casting—it is important to realize that the level of metal in the feeder rises only at the same rate as the level of metal in the mould cavity, as is demonstrated in Fig. 6. That's it, then! The rules are simple enough, but you've got to stick to 'em if you want your spinner to work. And you can take it from me that when it's *intelligently* used it's a very good slag trap indeed! Try it, and see for yourself!

6.—*It is important to ize that the level of metal in feeder rises only at the same as the level of the metal in mould cavity.*



land Link with Spanish Company

financial link-up has been made by Leyland ors, Limited, with the Spanish automobile company mpressa Nacional de Autocamiones S.A., manu- urers of Pegaso commercial vehicles. This factory visited by participants in the recent International ndry Congress. Sir Henry Spurrier, chairman and aging director of Leyland Motors, Limited, and Donald G. Stokes, the company's general sales service manager, have accepted an invitation to the board of directors of ENASA. Mr. Stanley kland, Leyland's works director and managing ctor of Albion Motors, Limited, has agreed to act echnical consultant for manufacturing and produc- processes at the Spanish factories.

yland and ENASA under an agreement signed e time ago, have been interchanging technical rmation on the development of commercial cles. Now the Leyland company has purchased bstantial share holding in the Spanish company, h is sponsored by an organization known as the tuto Nacional de Industria.

Half-year Results of Metal Box Company

Interim dividend for the year to March 31, 1960, is being raised by the Metal Box Company, Limited, to 4 (3⅓ equivalent) per cent. Total for 1958-59 was equal to 8⅔ per cent., adjusting for a one-for-two scrip issue. Group net profit for the half year to September 30, 1959, declined to £2,017,000 (£2,221,000), but indications are that the result for the year will be about the same (£3,913,000) as for the last financial year. Sales rose to £39,021,000 (£38,035,000), but the actual volume of sales was even greater because of policy decisions to reduce prices and to pass on savings arising from improved techniques.

Of the 1,000,000 shares subscribed for in the Steel Company of Wales, Limited, in 1957, 750,000 have recently been sold for £1,700,000 which will be used to finance various plans for expansion. Four new factories—at Speke, Arbroath, in Italy and South Africa —are planned, and it is expected that the building of the company's first Scottish factory will begin in February or March of next year.

British Standards Institution

Committee Meetings and Standards

Meetings of two sub-committees of the British Standards Institution—ISO/TC 24 SC1 and 2. Sieves—were held at The Hague in October. In sub-committee 1, which deals with test sieves, useful conclusions were reached on such matters as the designation of test-sieve apertures, and on the completion of a series of 19 aperture sizes. It is expected that a draft ISO proposal covering this international range of aperture sizes will be prepared in the near future. General principles for future discussion on tolerance for mesh aperture and for wires for woven wire sieves were laid down, and following discussion on aperture dimensions of perforated plate sieves, the German secretariat was asked to prepare a document showing a comparison of dimensions at present in use in various countries.

At the meeting of sub-committee 2, which deals with methods of using test sieves, it was decided that the secretariat should immediately prepare a draft ISO proposal on recommended procedure for test sieving. In addition, the meeting defined certain user requirements, and also recommended that in presenting the results of test sieving, a tabular presentation should be given on all occasions. This it was decided could be followed by suitable graphical presentation.

The ISO TC 48 committee (laboratory glassware), held its sixth meeting last month in London, when substantial progress was made in reaching agreement on internationally acceptable recommendations on: interchangeable spherical joints: one-mark volumetric flasks: one-mark pipettes: graduated pipettes: thermometers for precision use: calorimeter thermometers: hydrometers for general purposes: and procedures for testing chemical resistance of glass and glassware.

Other subjects discussed included general purpose glass stopcocks, methods of verification and use of volumetric glassware, and adjustable-range thermometers.

Standards Available

In the December issue of BSI *News*, is announced the publication of the first part, "Ropes and Fittings," of the Institution's Handbook No. 4, Lifting Tackle: price 30s. This is a revision of the earlier (1946) publication covering sections 1, 2, 3, and 7, edited by Mr. L. Linder. With one exception all the standards have been revised since 1946 and are now reproduced in full. They cover fibre ropes, engineering wire ropes, steel wire for ropes, Bordeaux connections, bull-dog grips, sockets, thimbles, rigging screws and stretching screws, capping metal, galvanizing, and wire rope slings. The editorial notes have been entirely re-written and deal with such matters as factors of safety, types and constructions of ropes, use and examination of wire and fibre ropes, storage, handling, coefficients for estimating rope tensions in pulley systems, terminal splicing, etc. The final section is devoted to the statutory requirements.

Also announced in this issue are the following New British Standards: 3141: Master schedule of wrought steels. Part 1:1959, Carbon Steels, price 10s., which covers the chemical composition for carbon steels necessary to meet all normal requirements. The steels are set out on a basis of chemical composition, with mechanical properties included where appropriate. BS 3156:1959, Methods for the sampling and analysis of fuel gases, price 25s. Methods described include the constant-volume and soap film method, and the *Metro method* for nitrogen, and BS 3176:1959, Printed *matter and stationery*, A and B series of trimmed sizes, 4s., which gives details of the international trimmed (finished) sizes of paper intended for administrative, commercial and technical uses and printed matter such as forms, professional periodicals and catalogues. The sizes do not necessarily apply to continuous stationery. Under New Aircraft Standards are listed: L 74:1959, Aluminium/magnesium alloy ingots and castings, 2s. 6d.; L 75:1959, Aluminium/silicon/magnesium alloy ingots and castings (solution treated and precipitation treated), 2s. 6d.; L 78:1959, Aluminium/silicon/copper alloy ingots and castings (solution treated and precipitation treated), 2s. 6d., and L 79:1959, Aluminium/silicon/copper alloy ingots and castings, 2s. 6d.

BS 131:—Notched-bar tests. Part 2: 1959 Charpy V-notch impact test, which comes under Revised British Standards, specifies the conditions for carrying out the Charpy V-notch impact test on metals, including nominal dimensions and tolerances for both steel and non-ferrous test-pieces. Also specified are structural and dimensional requirements for the testing machine and a note concerning the installation of the testing machine is given in an appendix. The price of this standard is 4s.

British Standards Reviewed and Confirmed include BS 1643:1950, Vernier height gauges (with published amendment) and BS 1889:1952, Dimensions for foundry moulding boxes. Amendment slips have been issued to BS 329:1957, Round-strand and flattened-strand steel-wire suspension ropes for lifts and hoists (amendment No. 2) PD 3540, and to BS 3063:1959, Dimensions of gaskets for pipe flanges (amendment No. 1), PD 3526. New work has been started on Steels for use in the chemical, petroleum and allied industries (revision of BS 1501-1506) and also for low-temperature and supplementary requirements of these steels (revision of BS 1510): reprints now available include BS 2629:1955, Pallets for materials handling suitable for transport by road and rail (2s. 6d.).

Amongst the several draft standards circulated for comment, those of major interest to foundrymen are A 1051, Reference tables for copper constanan thermocouples (8 pages): A 2066, Industrial eye protectors Part I—Eye protectors for general use, excluding high-velocity hazards (16 pp.): A 2344, Small domestic hot-water supply boilers (15 pp.): and A 2663, Diaphragm ball-valves (14 pp.).

Copies of these standards may be obtained from the sales branch of the Institution at 2, Park Street, London, W.1. When ordering amendment slips the PD reference number should be quoted, and draft standards which are free to subscribing members, cost non-members 3s. 6d. a copy up to 20 pages, and 5s for standards of over 20 pages.

Harborough Construction Deal

The Harborough Construction Company, Limited, of Market Harborough, Leicestershire, which manufactures foundry supplies, is to be taken over by the Crosby Valve & Engineering Company, Limited, of Wembley, Middlesex. The Leicestershire firm's managing director, Mr. W. E. Warrington, has issued the following statement. "Shareholders of the Harborough Construction Company, Limited, have accepted an offer of the Crosby Valve & Engineering Company, of Wembley, Middlesex, and this company will assume control as soon as all formalities have been completed, probably by the end of the year. The Crosby company is an old-established engineering firm with world-wide connections and it is hoped that the fusion of the companies will be for the benefit of everyone connected with the two concerns."

Madrid Congress Papers

Short Synopses of the World's Principal Contributions to International Foundry Technology

The following abstracts conclude the survey of technical papers[*] presented to the 26th International Foundry Congress, held in Madrid in October. The sixteen contributions summarized in this issue are the seven which were given in French, and the nine which were in German.

Hydrodynamics in Running Systems for Sand Moulds

By Michel Jeancolas, Georges Cohen de Lara, and Hubert Hanf (France) [in French]

In recent years, formulæ from classical treatises on hydraulics have been proposed for the determination of gating-system dimensions, and for the calculation of sand-mould filling rates. The authors now present a work on these subjects, consisting of a theoretical and an experimental section. The former is a review of up-to-date notions in hydrodynamics that a foundryman can use as an aid to determining a suitable gating system. The theoretical development on these subjects has deliberately been kept short, and the essential data resulting from them are presented with emphasis on their physical rather than mathematical aspect. For example, a certain number of fundamental parameters are set out, the effects of which have been studied experimentally on several of the gating systems most commonly used in moulding practice.

Results of Flow Tests

After commenting on the similarity of the flow behaviour of fluids at room temperatures in Plexiglass models to that occurring in molten alloys cast in sand moulds, the authors present the results of a fairly large number of these flow tests carried out with water, mercury, etc. They then go on to describe a new experimental method which has been developed. The initial results of these tests are also given:

(1) Flow effects observed with molten alloys in sand-mould gating systems are very similar to those associated with run-off of fluids at room temperature in models with an identical mould cavity, thus confirming the value of purely hydraulic experimental methods. Wherever major differences occur—which is especially the case where small-diameter gating systems are used for pouring alloys at a comparatively low temperature—these are probably due to the cooling of the alloy as it progresses through the feed system. Furthermore, where gating systems are subjected to considerable stresses during pouring, the results may be affected to some extent by changes in the dimensions of the system caused by thermal shock, or by erosion. However, this is by no means general, and it is entirely up to the foundryman to see that it does not arise.

(2) The flow distribution in a gating system depends solely upon the ratio between the ingate and the cross-sectional areas of the entire system.

(3) Although overall flow through a gating system can be obtained from a formula derived from the application of the laws of hydrodynamics, no very high degree of accuracy may be expected if the values of the essential factors, *i.e.*, the head loss coefficients—have not been determined experimentally for the particular gating systems considered.

(4) Considerable caution is required when using the coefficients generally found in hydraulics formulæ. Comparatively few of these have been been published, except for those issued by various manufacturers of water-supply systems and fittings for their own particular equipment. In the authors' opinion, only an experimental approach is satisfactory for present gating-system designs, and they list the coefficients for a few specific system layouts, which they found by carrying out tests with water.

Although an initial comparison between the results of tests with fluids at room temperature, and actual molten alloys is given in this paper, no exact values can be given for the head loss coefficients obtained from the initial tests with molten alloys cast in sand moulds until the present series of tests has been completed.

Significance of the Size and Quality of Coke in the Working of a Cupola

By Roger Loison, Louis Soubrier and Maurice Decrop (France) [in French]

The purpose of this study was to determine and confirm by experiment the quality of coke best suited for use in a foundry cupola. Two series of tests were carried out, in two cupolas of 28-in. dia. The first cupola was used for fairly short runs (3 to 4 hr.) with nine different qualities of 3.5- to 4.7-in. coke (one of these qualities was also studied in other sizes). All the runs were made with the same coke ratio, and results were classified according to the temperature of the cast-iron or the thermal efficiency. With the second cupola, 10-hr. runs were carried out with sixteen different grades of 3.5- to 4.7-in. coke, except for two unscreened lots which

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[*] The complete set of papers have been assembled into one loose-leaf volume. Readers interested in acquiring it should write to the Congress secretary, José Andrés, *Instituto del Hierro y del Acero, Cuidad Universitaria,* Madrid. Price available on application.

Madrid Congress Papers

served as a control for studying the significance of size. The screened lots were in fact of different sizes when actually used, owing to deterioration during transport. The tests were conducted at a constant cast-iron temperature, but with various coke ratios, and the grades were classified according to thermal efficiency.

Laboratory Tests

Side by side with these tests in the cupola, laboratory measurements were taken of the characteristics of the various grades of coke which might affect their behaviour in use: proximate analysis, elementary analysis, graphitization index, real and apparent density, porosity and reactivity. This last characteristic was measured first on a granulated sample at low temperature (1,000 deg. C.), and afterwards at high temperatures (1,200 to 1,500 deg. C.), when action is far more rapid and restrained less by chemical reaction than by diffusion of the gaseous products through the pores of the coke. This brought in the question of size and surface area, and necessitated the measurement of large samples (prisms of 16-cc. volume) so as to keep conditions as close as possible to those encountered in practice. A highly satisfactory relation was observed between reactivity (at 1,400 deg. C.) and apparent density of the coke, thus showing that porosity is the determining factor. Brittleness was estimated by means of a MICUM drum screening at 3.1 in. (Index M_{80}).

Results

With coke of constant quality, ranging in size from 1.6-2.4 to 3.5-4.7 in., cast-iron temperatures were found to be highest and hourly output lowest for the largest average sizes. These results tallied well with observations made on temperature ranges in the cupola, and on the composition of the flue gases. Coke which varied greatly in size gave distinctly less satisfactory results than screened coke, even if the latter was of smaller average size. Most of the intrinsic qualities of coke seem to have no effect on their practical efficiency, the only correlations observed being the following: (1) Thermal efficiency or cast-iron temperature fell as reactivity increased; this was observed with reactivity at 1,000 deg. C. for the first series of tests and 1,400 to 1,500 deg. C. for the second, when it became necessary to take account of the surface area of the coke at the time of use, since this varied so much owing to differences in the amount of deterioration suffered in transport. No relation was found between the reactivity of the various grades of coke and the composition of the flue gases; (2) thermal efficiency increased with the resistance of the coke to fracture (Index M_{80}); this relationship was verified by both series of tests. Further trials are now in hand.

Refining Pig-iron with Oxygen and Lime-dust

By B. Trentini, P. Vayssiere, J. Francais and M. Allard (France) [in French]

This is a report on blowing lime-dust suspended *in pure oxygen* in pig-iron refining. Lime injected this way has excellent reactivity and rapid solution. For several years IRSID have conducted many research projects in this field, and this is a summary of the results obtained with three refining processes.

The first process relates to conversion steelmaking, or more specifically to the OLP (oxygen, lance, powder) process, which consists of refining pig-iron in a vessel of the converter type, using a lance blowing lime-dust suspended in pure oxygen. Various types of converters described emphasize the flexibility of the process (new 50-ton symmetrical converter, 30-ton Thomas-type converter, 3-ton foundry-type converter). The process can be adapted to a wide variety of compositions, from phosphorous to hematite pig-irons, and can also make use of a wide range of lime analyses. The general principles of the operating procedure are outlined, as well as the main metallurgical results, illustrated by an example.

The second process relates more particularly to the open-hearth furnace, and consists of supplying part of the lime required for pig-iron refining by injecting it into the bath, in highly concentrated form, through a jet of pure oxygen. This operation can be carried out by means of lances introduced either through the furnace doors, or through the roof. The lime dissolves easily, and the slag becomes rapidly homogeneous, if the lime concentration is adapted to the evolution of the refining operation. The problem of slopping deserves special attention. It is interesting to note the almost complete elimination of red fumes when a sufficient concentration of lime is reached (about 12 kg. per Nm^3). However, many further experiments will be necessary to estimate more precisely the possible time-savings, as the latter depend on many variables, *e.g.*, furnace used, percentage of hot metal in the charge and pig-iron analysis.

The third process concerns partial refining of pig-iron. An oxygen-borne lime-jet first brings about an easy elimination of the silicon, with an appreciable lowering of the phosphorous content. The addition of fluxes to the lime and, when needed, iron oxide, makes it possible to eliminate most of the phosphorus, while keeping the major part of the carbon. The ladle-treatment plant used, on a 4-ton scale, is described, as well as the operating procedure. The results are illustrated by several examples relating to ternary mixes of lime-fluorspar-iron oxide (for instance 95-per cent. dephosphorizing for a 30-per cent. decarburizing). Desulphurizing is also quite extensive. The problem of the unbalanced thermodynamic condition between metal and slag is also outlined.

These three processes show the possibilities of development of pig-iron refining through lime-dust injection in pure oxygen, both in steelmaking and in foundry practice.

Technical Vocabulary and the International Foundry Dictionary

By Pierre Huberson (French Exchange Paper)

Language is the essential instrument for conveying ideas, particularly technical ideas, and the field in which exchange of intellectual information occurs is extremely wide. Without language, there would be no personal communications between men. It is the tool and the basis of commercial relations, transport and customs, Patents, all scientific and technical publications, educational works and standards. The perusal and absorption of this technical literature in various languages poses a problem of standardization of language within the framework of each country, and in the international field. This paper directs attention to the following points:

(1) The relative number of subjects treated and the languages in which scientific and technical publications are written throughout the world.

(2) Evaluation for each country of the number of specialists who are able to read foreign languages, and which languages are concerned.

(3) Various international standardizing organizations have had glossaries of technical terms prepared.

(4) Numerous multi-lingual dictionaries have been published, or are in preparation.

(5) The importance of, and difficulty presented by, the drafting of Patent specifications.

(6) Problems of translation, especially the technical kind.

(7) A solution to the problem of translation has been provided in France by the *Centre Technique des Industries de la Fonderie*. It is explained in detail how foreign publications are read, digested, filed, translated or abstracted and re-published, at the Centre.

(8) A dictionary of foundry terms in eight languages is being prepared under the aegis of the International Committee of Foundry Technical Associations.

(9) The method of working adopted by the French Committee, and by the various International committees.

(10) Importance of the future dictionary, and its field of coverage. This work will be done in such a way that it can easily be extended to other languages.

High-strength Zinc-base Casting-alloys

By Alexandre Krupkowski and Wladyslaw Kajoch (Poland) [in French]

The Zn/Mn/Cu alloys dealt with by the Authors have the physical and chemical properties which place them between commonly used brasses and alloys of zinc and aluminium. They are characterized by the electronic structure of the epsilon phase with the electronic concentration equal to 1.75, and the hexagonal lattice the parameters of which approach the value obtained in the close-packed hexagonal lattice. These alloys have a high strength; for example: in the zinc sand-cast alloy containing 19-per cent. manganese and 15-per cent. copper, the ultimate tensile strength averages 41.3 tons per sq. in., with an elongation of 9 per cent. Some alloys have greater values of elongation, *e.g.* the zinc alloy with 24-per cent. manganese and 14-per cent. copper has an elongation of 19 per cent., the ultimate strength being 36.2 tons per sq. in.

Alloy Characteristics

The alloys are characterized by high hardness (160 HB) and good wear resistance, especially in conditions of work without lubrication, exceeding in this respect the properties of brasses. Resistance to surface corrosion is a little higher than that of the Zn/Al alloys. The most harmful impurity in the alloys is carbon, which greatly reduces elongation. Iron has only a small effect on mechanical properties. To protect the molten alloys from oxidation, the addition of a small quantity of aluminium is recommended. The casting properties of these alloys are similar to those of brass, their resistance to heat-cracking means that they can be cast in metal moulds.

Mass and Physical Properties of Grey Cast-iron

By Albert de Sy and Jan Van Eeghem (Belgium) Exchange Paper) [in French]

The problem of the correlation between physical properties and mass of grey-iron castings has held the attention of a great many foundry metallurgists for some time. As a result of recent research work, particularly by Collaud, substantial progress has now been made. The Belgian Foundry Research Centre has studied this correlation problem with Belgian foundries, on a national scale. This work has involved approximately 40 *tonnes* of test-bars and castings, and thousands of mechanical tests. The results of this research are summarized in this Paper.

First of all, the authors deal with the correlation of tensile strength, Brinell hardness and mass in a statistical study, the influence of phosphorus being also taken into account. Also examined is the correlation between mass and transverse-strength characteristics. The validity of Collaud's formula: $\log \sigma t_x = \sigma t_{30} + 1.57 (\log \Delta_x - \log \Delta_{30})$ is also considered. Finally, numerous tensile-strength values obtained from a great many different melts of iron are compared statistically.

Gases in Cast-iron: Degassing Tests under Vacuum

By Sergio Gallo and Gino d'Alessandro (Italian Exchange Paper) [in French]

After considering recent developments in vacuum smelting and vacuum stream degassing in the field of steels, the Authors investigate the possibility of using this new technique with cast-irons. The effects have been studied of degassing grey and malleable cast-irons at different degrees of vacuum, ranging from ambient pressure to 0.5 mm. of Hg (practical limit for vacuum stream degassing). It has been ascertained that, in grey cast-irons, oxygen favours the formation of shrink-holes; while hydrogen and nitrogen, by stabilizing the carbides, cause the formation of hard spots and points, and mottled areas. In cast-irons intended for annealing, degassing accelerates remarkably the cementite decomposition process. The slowing down of the graphitization process in cast-iron smelted in air must be attributed to hydrogen and nitrogen, the effect of oxygen being negligible. For all types of cast-iron, high percentages of gaseous elements cause interdendritic microporosity and blowholes in castings. These flaws may be eliminated, however, by degassing.

Peripheral Blowholes in Cast Steel

By Josef Pribyl and Ondrej Starosta (Czechoslovakia)
[in German]

For the last twenty years steel firms in Czechoslovakia have been trying to eliminate peripheral blowholes, but they were not successful until recently. The reason for this continued unreliability was that no difference between peripheral blowholes and "effervescence blisters" had been established. The previous opinions on peripheral blowholes fell into four groups: the most correct of which estimated that the carbon monoxide resulting from the carbon reaction provided the impulse for the production of peripheral blowholes. The great differences betwen peripheral blowholes and effervescence blisters is described in the Paper.

The mechanism of the production of peripheral blowholes is explained on the basis of the energy field of the casting and mould. The lamellar pouring of a thin-walled casting in a green-sand mould with an oxidizing effect gives rise to the production of the transverse concentration gradient-FeO. This is characterized by a FeO ("active" oxygen) content which is considerably higher on the surface than in the interior of the casting. Thus, carbon reaction may take place at the surface and promote the production of peripheral blowholes. The kinetics for the production of peripheral blowholes is characterized by four stages: (1) The decomposition of the water vapour from the mould; (2) oxidation of the molten iron on the surface of the casting; (3) carbon reaction and inoculation of the peripheral blowholes by the CO produced, and (4) diffusion of the gases (hydrogen) in the violent small CO blisters, and their growth to final size. The different thicknesses of the layers of blowholes depends on the FeO concentration, and the different size of the blowholes on the dissolved gas content (hydrogen) of the steel.

Simultaneous Influences

The simultaneous influence of the deoxidizing phase in steel, and the effect of the atmosphere and of the green-sand mould may be set out as follows: with any given wall or mould, fully deoxidized steel does not produce either blowholes or peripheral blowholes. A badly deoxidized steel, or much deoxidized subsequently, produces blowholes with any given wall thickness and mould, throughout the whole section, but peripheral blowholes do not appear. With an incomplete degree of deoxidation, or an adequate subsequent oxidation by the oxygen in the air, the FeO content may be staggered, so that neither peripheral blowholes nor blowholes appear in the dry mould; in a green-sand mould peripheral blowholes are frequently produced in thin-walled castings, but rarely in those with thick walls. The reason for this is the transverse concentration gradient FeO obtained by the lamellar pouring of the thin-walled casting, and by the different oxidation effect of the green-sand and dry mould. The appropriate conditions are given in tabular form in the Paper.

Protective measures against peripheral blowholes are based on: prevention of steel contact with any form of moisture after "boiling"; not prolonging the charge after "boiling"; complete deoxidation; avoiding any useless transfer of the steel (in this case the subsequent deoxidation of the steel in small ladles is necessary), and avoiding depression in the runner system during pouring. These measures apply when a mould of oxidizing effect is used (such as a bentonite synthetic mixture).

Behaviour of Moulding Materials during Shock Heating, in relation to the Occurrence of Scabs

By H. G. Levelink (Netherlands Exchange Paper)
[in German]

In the first stage of an investigation into the elimination of scabbing, the behaviour of dried clay-bonded sands and of oil-bonded sands during rapid heating in a furnace was studied A similar inquiry into green moulding-sand had already been previously carried out, and had shown that the expansion phenomena observed play an important part in the formation of scabs and rat-tails.

These phenomena have now been observed with test-pieces which were put suddenly into a furnace at a temperature of 1,400 deg. C. The heated surface of the test-pieces under investigation was flat or arched. The specimens with the arched test-face appeared to have the greatest susceptibility to rapid heating.

During such heating a thin layer of sand, with a thickness of 1 to 4 mm., may be formed on the test-pieces. If a layer of blacking has been applied to the test-pieces, an area is often formed which consists of this layer of blacking with an adhering thin layer of sand, the thickness of which is variable. Such a layer appears to have a tendency to break and deform during heating. The cause of this phenomenon is a bending effect which originates in the layer of blacking, which has a smaller expansion than the layer of sand underneath. It appears that the influence of the layer of blacking on the behaviour of the test-pieces during rapid heating depends considerably on the thickness of this layer: there is a critical thickness at which the layer has the greatest tendency to break and deform. Below a definite thickness, however, the layer of blacking has no appreciable influence.

Influence of Sand Composition

With regard to the composition of the sand, the breaking tendency of the layer of dried clay-bonded sand decreases when the sand has a higher moisture nt. This tendency also decreases with the ion of a fine-grained material such as silica The type of bentonite used also has a definite nce. The oil-content of oil-bonded sand with ating of blacking is very critical. From an tigation of the hot-strength of this sand, it ne apparent that this strength may decrease out one tenth of its original value during an ase in temperature from 20 to 400 deg. C. big decrease in strength is probably the cause e small resistance to shock-heating of oil- ed sand with a moderate oil-content (*i.e.* 1 per and a coating of blacking. There is an gy between phenomena which occur during heating of the test-pieces in the furnace, those which occur during the formation of . In the first place the formation of a at the surface of the mould or the test- has been ascertained in both cases. Further, reaking of the layer, which is observed during heating of test-pieces, is also necessary for ormation of a scab. However, as far as fluence of the pressure of the molten metal in ould on the breaking is concerned, this part e phenomenon cannot be reproduced in the ce. Nevertheless, the rapid heating of test- s in a furnace allows the tendency of a mould- nd to scab to be estimated in many cases.

aphitization of Ductile Cast-iron during Tempering

Dr. P. Rys (Czech Exchange) [in German]

review of the changes which take place in le cast-iron quenched during heating in the erature range 22 to 710 deg. C. is presented, reatest attention being given to the secondary itization which is produced with extraordin- apidity in this material. All the studies were d out on one type only of ductile cast-iron. etermine the influence of structure on secon- graphitization, other types of treatment— mpering, normalizing, deformation, and low- erature pre-heating—were also applied. The was principally based on dilatometric investi- ns carried out with continuous heating, accord-) Chevenard's differential method, and at con- temperatures in accordance with Bollenrath's ed absolute method. The dilatometric investi- ns were systematically controlled by metal- phic and X-ray investigations, as well as by ess and resilience measurements and thermal ses. On tempering at low temperatures and normal periods of time, tempering of ductile ron develops as in silicon steels. The high n content does not modify the temperature e first temper phase to any great extent but es, on the other hand, considerably increase emperature of the second and third phase of ering. With these processes, only the third er phase has a direct influence on the forma- of graphite nuclei. Secondary graphitization ops very rapidly when tempering at high eratures—the production of graphite nuclei decisive influence on its development, depending on the condition of the matrix. This condition also affects the graphite growth rate, and it may be modified by various ductile cast-iron treatments prior to the graphitization anneal.

Structural Defects

A report is also given on structural defects, both stable and kinetic, and their relationship to the production mechanism for graphite nuclei; this hypothesis, it must be assumed, is, in general, also valid for other graphitization cases. Graphitization is favoured by all types of treatment—quenching, deformation, chill-casting—which give rise to stable defects such as accumulation of dislocations, microcracks and microcavities, and grain and phase limits. To avoid graphitization of iron and steel machine-parts subjected to high-temperature conditions, it is suggested that austempering, instead of toughening, should be adopted. Structural defects also have a decisive influence on both the production of graphite nuclei, and their growth.

Porosity in Steel Castings

By Otto Heide (Exchange paper) [in German]

This work was undertaken to determine the factors which influence porosity in steel castings. Only carbon steels cast in bentonite sands or Croning shells were examined. As test elements, specially-shaped pieces with regular contours were used, thus keeping the influence of the mould constant. A special sampling method was designed, consisting of a quartz cup, with a capacity of 50 gm. of molten steel, which, immediately after filling, was carried under pressure to the mercury charge of a vacuum-chamber. In this kind of hydrogen sampling the greater part of it is precipitated under mercury. As analysis apparatus, a hot-extraction plant prepared for charging 20-mm. dia. steel samples which successively extracted two molten samples at 1,650 deg. C., and an Allino furnace for high-vacuum treatment at 1,200 deg. C. of solid samples, were available. After annealing for one hour, the extraction at 1,200 deg. C. resulted in a practically quantitative elimination of hydrogen.

Absorption of Hydrogen

The investigation of absorption of hydrogen by steel in bentonite sand moulds showed that the moisture content of the sand did not influence absorption. Pouring temperature was found to be a factor of decisive influence, however. A correlation was observed between porosity and the final hydrogen content in steel on the one hand, and silicon or silicon-plus-aluminium content on the other. By means of a special refining method which consisted essentially of refining without the addition of coal to the slag, the charging of steel with hydrogen in normal refining times was made possible with the use of air moisture only up to boiling, and hydrogen afterwards. By evaluating test results on the limit values of porosity, and the absorption of hydrogen by the steel in terms of pouring temperature, the porosity-free castability limits were determined for carbon steels of different deoxidation rates.

Madrid Congress Papers

Vacuum-casting of Grey Iron

By Otto Necas and Robert Kamensky (Czechoslovakia) [in German]

This paper deals with research on vacuum-casting of grey cast-iron, undertaken by the Research Institute of the Vitkovice Steel Works, Klement Gottwald National Corporation. Grey cast-iron with the usual chemical composition was melted in a high-frequency furnace, and was cast at about 1,220 deg. C. in such a way that half the charge was under vacuum, the other half being poured under normal conditions for the sake of comparison. The chemical composition of the vacuum-treated cast-iron remained unchanged, except for sulphur, which was reduced in most cases by about 10 per cent. Gas content was reduced considerably: hydrogen by 49, oxygen by 21, and nitrogen by 42 per cent. The gas analyses were obtained by the chromatographical method (vacuum extraction from the molten metal in a high-frequency heating apparatus). Regarding the influence of vacuum-casting on properties of casting, it has been ascertained that the tensile strength of grey cast-iron decreases by about 20 per cent., and its hardness by about 13 per cent. This unfavourable influence upon mechanical properties is due to a change in the microstructure of the iron.

Vacuum-treated castings have more ferrite and under-cooled graphite than usual. However, there are no differences in the macrostructure. The relationship between the mechanical properties of grey cast-iron and its structure was also studied —by means of the transverse-testing apparatus which enables one to watch the plastic deformation of metals directly on polished specimens under a microscope. It has been found that fracture cracks in vacuum-treated castings run mainly through areas with undercooled graphite, and occur even with low stress. In specimens taken from ordinary castings, where the graphite was distributed more regularly, these cracks ran through the middle or along the boundaries of the graphite lamellae.

Solidification and Crystallization in the Manufacture of Steel Castings

By Bernhard Matuschka (Austria) [in German]

The development of the solidification processes in iron, the crystallization processes and formation of casting structures, and progressive freezing after pouring, are first dealt with. Then, solidification shrinkage and solid contraction of unalloyed and alloy steels, and shrinkage in steel sand-castings as compared with steel die-castings, are considered. Shrinkage displacement, ferrodynamic processes and effects, and the tendency of steel to piping come next, followed by a description of the Tatur truncated cone test for investigating pipe shape. The next section of the paper deals with: gross shrinkage defects, scattered shrinkage, removal of steel castings from moulds, microshrinkage, discontinuities in crystallization and solidification cavities, and spontaneous crystallization and crystal dross. Finally, the destruction of cast structure and anneal homogenization, and the influence of weak spots in crystal-grain boundaries on strength properties of cast steel, are commented upon.

Effect of Free and Combined Magnesium on Formation of Graphite in Cast-iron

By D. Pohl, E. Ross, and E. Scheil (Germany) [in German]

A method of distinguishing combined magnesium from free magnesium was developed. As an equilibrium is established during pouring, a somewhat arbitrary but clearly suitable value was used, since the real value can be obtained only by means of a careful kinetic study. The measurements were correlated with measurements of surface stress, and microscopic investigations. The influence of the magnesium addition on surface stress is based, up to a maximum, on the reduction of sulphur content. The formation of spherulites does not occur until free magnesium is present together with combined magnesium. Some tests were also carried out with disturbing elements. Besides those already known, phosphorus and magnesium were found to be weak disturbing elements. Magnesium is necessary for the formation of nodular graphite. It does not, however, accumulate with the graphite but remains mainly in the matrix.

Solidification of Centrifugally-cast Pipe

By Heinrich A. Nipper (Germany) [in German]

The many factors which influence the solidification process in centrifugally-cast iron pipe are considered. Three different main groups of influencing factors are established, namely: those affecting the behaviour of iron, those produced by the ingot mould, and those depending on the different work methods in each case. A detailed description of the De Lavaud method is given, with many graphs of the faulty conditions which occasionally appear. Reference is made to the significance of the rate of flow of iron into the mould, and its subsequent acceleration and distribution, in the production of sound pipe.

Separately-cast Test-pieces in Sand Moulds, for Copper Alloys

By Z. Gorny and A. Fijal (Poland) [in German]

Since separately-cast test-pieces may be defective in the same way as normal castings, casting them properly becomes important. Test-bars were cast according to American, British, French, Czechoslovakian and Polish standards. The investigations were carried out in two stages on alloys of the following chemical compositions: Sn 5—Zn 5—Pb 5—Cu bal.; Al 10—Fe 3—Mn 2—Cu bal.; Si 3—Zn 3—Mn 1—Cu bal.; Cu 58—Al 2—Fe 2—Mn 1—Zn bal.; Cu 60—Pb 2—Zn bal., and Cu 80—Si 4—Zn bal. Effect of pouring temperature on tensile was also investigated.

American
ks at Coalbrookdale

Extracts from " The Gilpin Reports "

lation to the recent celebrations arising
e quarter-millenium of the Coalbrookdale
y (see JOURNAL October 1 and 22), it is
g to record some of the impressions gained
owned American observer who visited the
uring trips to the British Isles between 1795
4. The following extract* is taken from
entitled "Joshua Gilpin: An American
turer in England and Wales" presented
cience Museum, London, on November 4,
Harold B. Hancock and Dr. Norman B.
n, before the Newcomen Society . . . which
for the study of the history of engineering
nology."

The Making of Iron

a section dealing with coal-mining activities
port of his trips to the British Isles, Gilpin
d by describing the making of iron. This,
ors refer to in the following terms:
oalbrookdale in Shropshire Gilpin observed
and coal complemented one another most
. Through a distant relative, Mark Gilpin,
in the Coalbrookdale Company, he readily
access to the works. He was told that the
ompany was founded about one hundred years
y some Bristol businessmen and Abraham
At the time of his visit, the Reynolds family
d the Mayley Wood works and Ketley of the
estate, and the Darby family operated iron-
Horsehay and at the original plant.
, iron and limestone were found in close
y. In some of the iron strata Gilpin saw
rms that interested him. The coal possessed
able characteristics of not being sulphurous
caking. The iron ore was separated from
marl and usually roasted in heaps at the spot
was dug, to free it from impurities. Custom-
ortions of these three basic substances were
ckets of ore, one of limestone, and two of

furnaces were built of local brick, and some
in constant blast for 16 years. The furnaces
ard of two tons twice every 24 hours. When
om of the furnaces was full of molten iron,
vas rung:
hen ye workmen hear the bell each moulder
the various rooms runs with his Ladle of
to catch a due quantity of metal & takes
his mould which he fills with it—as a mould
ways to be filled at one pouring if one man's
will not hold enough at a time a large one
rought carried by two or more persons & if
ry large casting, the metal is run into a large
& both hoisted & carried to the mould by a
ne. After the moulds were filled, the re-
nder of the metal was run into pigs. Some of
pattern moulds were made of brass and others
ard wood.

"Gilpin was greatly interested in the bellows he saw at Coalbrookdale. These were operated by a water-wheel. The cylinders were 7 ft. in diameter and 4 ft. high. A square valve of leather was in the centre, and the edges were also made of leather. When the bellows were alternately raised and lowered, air was forced into a common pipe and conveyed to the furnace.

"In connection with his account of Coalbrookdale. Gilpin devoted several pages to a description of a machine for boring pipes. He drew an elaborate sketch which he labelled "J. Wilkinson at Bradeley," though it would seem to apply to the operations at Coalbrookdale.

"He attempted to describe the differences in the manufacture of iron by old and by new methods. The furnaces at Horsehay and Coalbrookdale followed the old process, while at Ketley and at J. Wilkinson's newer methods were used."

Making Iron the Old Way—First

The iron ore is burned or calcined by placing it in heaps & firing it with coal for abt [blank] hours—

This is done with all the ore of the Country, but the Lancashire, Cumberland & Westmorland do not require it, nor indeed any pure ore, but that of Shropshire being full of many substances does—the quality of the Shropshire Iron is very different, & it is mixed together—at Coalbrook Dale they make use of none but of the neighbourhood—at Wilkinson's they use those of Lancaster &ca.—

The Coaks & Limestone being all ready—the ore & they are thrown into the Top of the Furnace according to the judgment of the person who attends it—the proportion at Wilkinsons abt. [blank] of Iron to [blank] of Lime & [blank] Coaks.

In the first process the new & old modes agree so as to bring them into Pigs—In the second which is called the refinery the old & new mode differ—

The refinery is built like a common Smith's forge all open—the bellows have two Pipes behind abt. 2 ins. diamt. each which are forced by the Steam engine & send a large body of air thro. The hearth of the furnace or forge is of fire brick abt. 6 to 7 ins. deep & abt. 2½ wide or square—from the bottom of the hearth is a hole or outlet, by which the iron when melted runs out into a square trough in the floor of the house near the forge abt. 4 feet by 2 feet & 6 in. deep—this is the mode in which the forge is made for the new process & old tho in the old the square Trough in the floor is unnecessary but the furnace may be made as a Smiths usually is—

Second Process, Old mode

The Pigs are put in the refinery with a sufficient Qty. of Coak & a person to attend them who keeps them covered & stirred about until they weld and concock together in a round lumpy mass without melting. This process is conducted very much according to the experience of ye workmen & is called [blank]. They are now fit for the third process.

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hed by permission of the Newcomen Society.

An American looks at Coalbrookdale

Third Process

The above concocted or welded Mass of Iron is taken out & rolled, beaten by hammers—to weigh Plates abt. 1 inch thick—It is then broken by Sledge hammers, & the pieces put into Pots or Sackers or on Tile made of Stourbridge Iron & in this state put into the bloomery ovens or furnaces which are made air furnaces for the heat to pass over, but the Coal not to get among them. Here they are kept till welded or heated together again, when they are taken out by iron tongs & put under the forge hammer where they are beaten into pieces abt. 2 feet long & 2½ inches square—they are then heated again & beaten or rolled out into barrs of a rough thick form—then heated again & beaten or rolled out into compleat Barrs or such width & thickness as the uses for which they are wanted require—

The extracts from Gilpin's reports continue with sections on new modes of making bar iron, copper manufacture, lead-shot production and conclude with an account of pin making.

The Gilpin Journals

In the earlier part of their paper, the Authors refer to the source of their information, namely, "The Gilpin Journals" and explain that paper-making was one of the early industries of major importance in the State of Delaware, USA. When research in this subject was begun in 1954, preparatory to the construction of an appropriate exhibit in the Hagley Museum of Early American Industries, attention was called to some 62 journals written by Joshua Gilpin that were in the Pennsylvania State Archives in Harrisburg. Gilpin, with other members of his family, began Delaware's first paper mill in 1787 and operated it until 1837.

Examination of the journals disclosed that they were written while Joshua Gilpin was visiting the British Isles and the Continent on two trips, one covering the years 1795 to 1801, and the other from 1811 to 1814. The journals show that Gilpin was a tireless recorder of all he saw. His interests were catholic but particular attention was given to the many burgeoning industries and their technological methods of the late 1790s, as well as to the commercial life of the times. The Gilpin family also conducted a thriving commission merchant business in Philadelphia, then the capital of the United States.

First American Papermaking Machine

Gilpin came from an English Quaker family that had migrated to America in the 1690s and had prospered in Philadelphia as merchants. Encouraged by Benjamin Franklin, Joshua, and his uncle Miers Fisher had begun the manufacture of paper in 1787 in a mill along Brandywine Creek near Wilmington, Delaware. Here in 1817, a younger brother of Joshua's, Thomas Gilpin, using the information about John Dickinson's endless paper-making machine acquired by Joshua while in England, "invented" the first successful American papermaking machine. Along with their paper mills, the Gilpins at various times also operated cotton and woollen mills on the Brandywine, conducted a commission business in Philadelphia, and invested in western Pennsylvania lands.

Although his formal instruction had ended with grammar school, Joshua Gilpin continued to educate himself through wide reading, observation and travel. His library contained books on philosophy, chemistry, geology, history, and works of English literature. Indeed, he fancied himself something of a literary man, privately publishing a book of verse and an essay on the Delaware and Chesapeake Canal, an improvement largely promoted by the Gilpin family. In the spirit of his time, he apparently sought to become a "universal" man: one who knew something about everything and had travelled widely. This latter ambition was realized by the two "grand tours" of England and the Continent which he made, from 1795 to 1801 and again from 1811 through 1814. He returned to Delaware from his first tour in 1801 accompanied by his English wife, Mary Dilworth, daughter of a Lancaster banker. Stowed away in his portmanteau were scores of small memoranda volumes packed full with his observations and comments on things foreign.

Powell Duffryn Engineering acquires Pipeweld

Whole of the share capital of Pipeweld, Limited, Manchester, has been acquired by the Powell Duffryn Engineering Company, Limited. The acquisition will enable Powell Duffryn Engineering to undertake, as an integrated project, comprehensive installations involving not only the storage tanks and vessels, but also all the associated pipework and long-distance pipelines.

The directors of Pipeweld are:—Mr. D. G. Badham (chairman); Mr. G. Basil Jones (managing director); Mr. E. H. Jerrett, and Mr. W. P. Warren.

Powell Duffryn, Limited, also announces that a new subsidiary of Powell Duffryn Engineering has been formed under the title of P.D. Equipment, Limited. The new company will be concerned with the marketing of shop-fitting equipment and certain other products.

Colvilles Final Dividend

Final dividend of 8 per cent., as before, by Colvilles, Limited, the Scottish steelmakers, makes a 14 per cent. total for the year ended September 30, 1959, an increase of 1 per cent. The company's consolidated profits rose from £11,152,075 to £11,813,912.

After depreciation of £2,462,004 (£2,500,191), tax of £3,676,817 (£4,437,034), and £2,000,000 (same) to general capital reserve, the net profit of £3,675,091 compares with £2,214,850. Sir Andrew McCance is chairman of the company.

The directors state that the recession during the latter half of the previous year continued during the opening month of this year, but a recovery in demand started in the light products and is spreading to heavy material. All present indications point to an increasing pressure of demand for all classes of steel.

Recent Research Work

October issue of the *Journal of Research and*
ment of the British Cast Iron Research Asso-
contains a Report from Mr. J. V. Dawson on
ing and Hydrogen Pick-up in Malleable Cast
The Author summarizes the results of his work
ollowing statement:—
major fact emerging from the experiments
ken is the danger of producing pinhole defects
ng aluminium to malleable iron. This risk is
ore pronounced if aluminium is added to high-
ese pearlitic material. In the absence of alu-
, the hydrogen pick-up increases with increasing
ese content and this is independent of the
content of the base material. When aluminium
d to metal with a low sulphur-content, the
n pick-up is less than when added to high-
material. When boron is added to high-
metal with high or low manganese-contents,
ificant increase in hydrogen pick-up occurs. It
g been the practice to add a small amount of
um to malleable cast-iron to improve its anneal-
perties. While large numbers of cases must
here no trouble from pinholing is experienced,
eased hydrogen pick-up due to this aluminium
ys a potential source of trouble. An increase
inium addition, which is made for any reason,
to result in an outbreak of pinholing; there
fact, records of industrial cases of this occurring
al blackheart compositions.

Addition of Manganese

production of pearlitic-malleable iron is some-
chieved by ladle additions of manganese to a
blackheart material. This addition of man-
produces a considerable increase in hydrogen
, but no pinhole defects have been found due to
drogen pick-up. However, when the usual addi-
aluminium is made as well, the hydrogen pick-
hes extremely high levels and severe pinholing
esult. Again this problem has been met in the
It is interesting to note that the pick-up due
inium is much greater when the sulphur content
It is not a practical proposition, for a number
ons, to reduce the sulphur content of malleable
a very -low level. On the other hand, any
sary rise in sulphur content may lead to an
tly inexplicable crop of hydrogen defects.
ously the surest way of avoiding any possi-
f the defects occurring is to eliminate the addi-
aluminium completely. Failing this, the addi-
st be kept to an absolute minimum which can
found by experience in each plant. If this
m be too low to confer the required annealing
ies, then the addition of ferro-boron must be
red. This addition will give good annealing
ies without any increase in hydrogen pick-up.
possible to give the amount of boron addition
will be equivalent to a specific aluminium addi-
d each case has to be considered on its own
If, when all points have been considered, a
ould arise when the addition of aluminium is
ry, then experience has shown that some reduc-
hydrogen pick-up can be achieved by adding the
ium some minutes before casting. For instance,
ge service ladle is used to feed a series of cast-
lles, then adding the aluminium to the service
an give a lower pick-up than if an equivalent
t was added to each casting ladle. The reason
s is obscure and careful chemical analysis has
to reveal any change in total aluminium content, or the manner in which it is combined, in relation to the method of addition.

Some evidence is also available which suggests that the use of a synthetic sand with a low moisture-content and high permeability gives less hydrogen pick-up, and therefore fewer defects, than a natural sand with more moisture and low permeability. However, the reduction in hydrogen pick-up arising from either of these suggestions is small compared with that of omitting the aluminium completely.

A second Report in the *Journal* is by Mr. A. G. Fuller, M.SC., on "Sinking under Bosses on Thin Plates," and he has drawn the following conclusions from his research:—(1) When using irons of the degrees of nucleation and compositions set out in the report, sinking is at a minimum when the pouring temperature is within the range 1,280 to 1,330 deg. C. (2) The depth of sinking is increased as the pouring temperature is either increased above or decreased below this range. The magnitude of the effect depends upon the design of the casting. (3) The effect of pouring-temperature upon sinking is believed to be governed at low pouring-temperatures by the number of eutectic cells growing and at high pouring-temperatures by mould variables. (4) Increasing the furnace temperature and the furnace holding-time will decrease sinking and the degree of eutectic nucleation of the melt.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

810,030 D. M. Morgenstern, 21111 Edgecliffe Boulevard, Euclid, Ohio, USA.

Improvements in methods of die-casting under vacuum, which the inventor claims give a reduction in the percentage of rejects encountered in a given batch of castings. (See also B.P. 780,126, FOUNDRY TRADE JOURNAL, November 7, 1957.)

810,294 J. B. Brennan, 13018 Lake Shore Boulevard, Cleveland, 8, Ohio, USA.

This Patent provides for a method of casting in which a mould is moved with respect to a molten metal supply source, and is charged at successively higher level of the mould cavity, each charge flowing upwardly into that cavity.

810,357 Morris Beam & Company, Yellow Springs, Ohio, USA.

A novel method of casting ductile iron is claimed in this Patent. The iron is cast against a mould member having a desired surface configuration. In this mould is a layer of refractory heat-insulation material (*e.g.*, hollow glass spherules) which forms a thermal barrier adjacent to the portion or portions of the article or articles which are of thin section and are to be ductile as cast.

810,442 Doittau Produits Metallurgie, Les Tarterets, Corbeil, Seine et Oise, France.

This invention provides for a lining for a feed head of an ingot or other metal casting mould. This lining consists of a number of shaped fabricated elements, each comprising a layer of exothermic product and a layer of a heat-insulating material (such as agglomerated moulding sand) which faces the interior of the mould for the purpose of delaying combustion of the exothermic product until the metal in the mould begins to solidify. (See also B.P. 808,839.)

B. ELLIOTT & COMPANY, LIMITED—Mr. C. H. Frye has resigned his directorships in the group due to ill health.

Equipment and Supplies

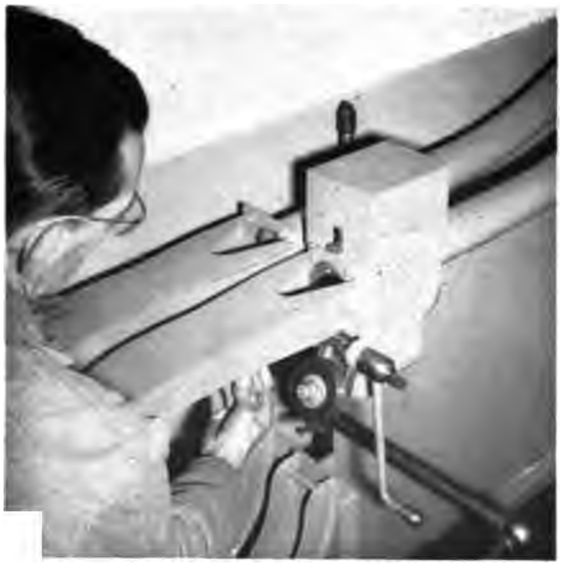
Airtube Sample-carrier

A new airtube system, designed to carry metal samples at high speeds between furnace and analytical laboratory, has been introduced by Lamson Engineering Company, Limited, Hythe Road, London, N.W.10. The system is operated by compressed air, and can carry samples weighing 4 lb. at high temperatures, at speeds of 40 to 50 m.p.h. High-speed analysis of samples in the course of a melt is of great importance in modern foundry production, since the time spent in transferring the sample from furnace to laboratory may effect the rate of production. Furthermore, the handling of samples while still hot can have distinct advantages. The carrier in which the sample is conveyed measures internally 2-in. dia. by 4-in. long. The head is in the form of a sleeve fitting over the carrier, and the tubing in which it travels is 3-in. dia. and can be laid underground, overhead, or inside ducts. When the carrier is inserted in the end of the tube (Fig. 1) a door is shut, automatically operating an air-valve which admits compressed air for a predetermined period to propel the carrier to the receiving end. Normally, only one tube is needed with carriers passing in both directions. Where traffic is heavy, however, a two-way system can be installed, using each tube for one direction only. This system has been extensively tested by one of the big steel manufacturers, and it has been discovered that a distance of 1,250 ft. between furnace and laboratory can be traversed in 17 sec., at over 40 m.p.h.

Gravity-die-casting Machine

A simple die-casting machine (Fig. 2) which employs inexpensive dies and, it is claimed, can be operated without previous die-casting experience, has been introduced by the foundry division of Electric Resistance Furnace Company, Limited, Netherby, Queens Road, Weybridge, Surrey. It has been designed to reduce both the capital and running costs of producing iron and light-metal castings which do not need to be made to very close dimensional tolerances. The machine has a two-way cylinder for closing and clamping the dies and requires only a supply of compressed air for its operation. The die-heating and -cooling arrangements of conventional die-casting machines are not required: dies are made in a grade of Meehanite metal to withstand thermal shock and the machine is used in banks of sufficient numbers to allow time for natural cooling. For making iron castings weighing about 3 lb., the dies require a cooling time of about 4 min. In this time two operators, one pouring and the other removing the castings, could, it is stated, tend 15 machines and produce 225 castings per hour.

FIG. 1.—*A carrier being inserted into the airtube sample-carrier introduced by Lamson Engineering Company, Limited, of London.*



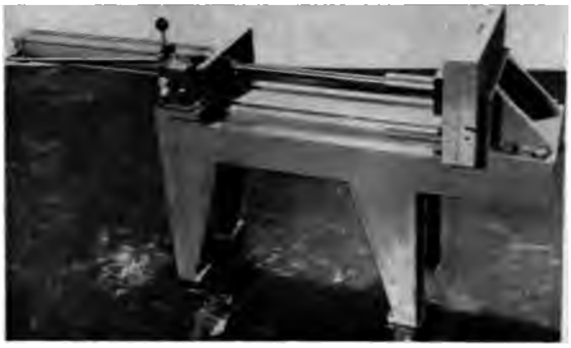


FIG. 2.—*EFCO gravity-die-casting machine, with the die closed ready for pouring.*

Dies are designed by EFCO from customers' drawings and supplied ready for insertion into the casting machine. They are made by the "true-to-form" as-cast technique at a relatively modest cost. The machine has an overall length of 3 ft. 10 in., is 9 in. wide and stands at a convenient height for pouring. It will accommodate dies up to 10 by 8 in. in face area. A bank of five machines—with gangways and stillage or bogie room—occupies a floor space of approximately 8 sq. ft.

High-temperature Ammonia Dissociators

For some years, the use of 75 per cent. hydrogen/25 per cent. nitrogen mixtures (derived from "cracked" ammonia) has grown steadily. More recently the high-temperature type of cracker has increased in popularity as it obviates the necessity of water scrubbing to remove residual ammonia. Using a specially developed catalyst, high-temperature ammonia crackers are now being produced by the gas-atmospheres division of the Incandescent Heat Company, Limited, Smethwick, Staffs, to the design of the Drever Company, Bethayres, USA. These plants have outputs from 150 to 5,000 standard cub. ft. per hr. and are produced in ten standard sizes. High-temperature cracked ammonia is used in the heat-treatment of metals, sintering, welding, controlled nitriding, degassing of metal baths and in metal cleaning by the sodium hydride process.

Braked Motors: Newman Industries, Limited, of Yate, Bristol, who introduced recently a complete range of electric motors incorporating a disc-type electromagnetic brake, announce that they have increased this new range from fractional to 15 h.p. up to fractional to 40 h.p. (3,000 r.p.m.).

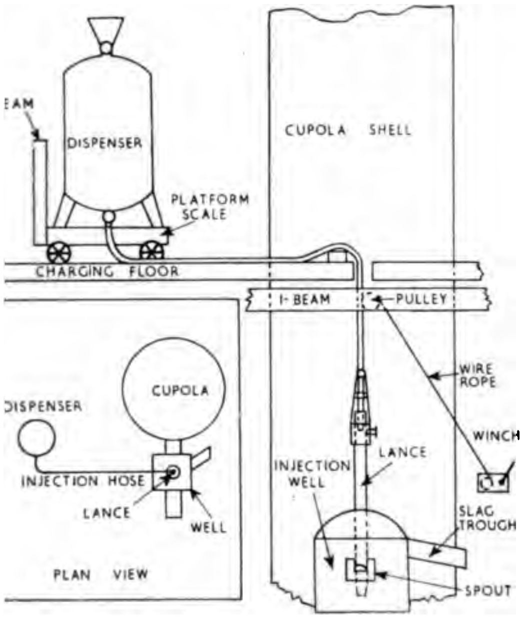
American Letter

tinuous Carbon Injection*

the carbon-injection process, fine particles of nite or other carbonaceous material, carried by a m of relatively inert gas such as nitrogen, enter nelt through a graphite tube or lance immersed in nolten metal. The carbon particles are delivered point below the surface of the melt where they eadily dissolved—in this way high recoveries are ned. The equipment and general technique used imilar to those required for desulphurizing by the tion of calcium carbide, lime or aluminium-mag- m alloys. Basically, the dispensing equipment sts of a pressure vessel, mixing assembly and ery system. At the low feed rates of two to three er min. used in the authors' investigation the hose ause blockage, and stop the flow of graphite. The ion lances were graphite "fluxing tubes," with outer dia., ½-in. inner dia., and a length of Electric-furnace graphite was used, of the follow- ipproximate sieve analysis: 5 per cent. retained 10-mesh, 80 per cent. on a 65-mesh, and 15 per on a 100-mesh screen.

inuous Operation

e main object of these tests was to determine ner the dispenser was capable of continuous opera-



1.—*Layout of the apparatus for testing continuous carbon injection, etc.*

at a feed rate of two to three lb. of graphite per A secondary objective was to find a solution to roblem of lance erosion and blockage. A sketch complete test apparatus is shown in Fig. 1. These showed that the dispensing equipment could be ted at feed rates as low as 1.75 lb. per min. for ndefinite period. The only interruptions were o lance erosion and blockages, which occurred at 15- to 20-min. intervals. At first two lances were used, changing after every blockage, a new lance being inserted while the blocked portion of the first lance was removed so that it could be put back in service after the second lance failed or became blocked. A further objective of the tests was to solve the problem of lance failures and blockages, and once this was done, to determine suitable dispenser settings for a consistent carbon increase from 3.30 per cent. to 3.65 per cent. It was eventually discovered, after further work, that the problem of lance failures and blockages could be solved by immersing the lance in the melt at an angle of about 45 deg. Many minor problems of operation were encountered. For example, moisture entering the dispenser is absorbed by the graphite, and causes blockages at or near the feed valve. Methods were developed to blow out such moisture.

Carbon Control

For a given initial carbon content, the control of final carbon depends on (*a*) feed rate, and (*b*) carbon recovery. The feed rate depends primarily on the tank pressure and flowrator settings. Carbon recovery depends on the percentage of carbon in the powder, the immersion depth and the chemical composition of the metal before treatment. It was found that the fluctuations in metal temperature at the forehearth did not cause any appreciable variation in carbon recovery. It was also discovered that an average immersion depth of 18 in., with a maximum variation of ±4 in., resulted in quite uniform values for carbon pick-up, and good control of the final carbon content. Close control of carbon content has been achieved by the authors during regular plant operation with carbon injection, the average variation in carbon contents for 20 successive eight-hr. shifts being 0.18 per cent. At present, the limiting factor in application of carbon injection is the increase in sulphur content as the pig-iron charge is decreased. It was determined that a saving of about 10 per cent. per ton charged could be realized with a final carbon content of about 3.60 to 3.70 per cent., with simultaneous desulphurization.

AIME Electric-furnace Programme

A meeting of the electric furnace committee of the iron and steel division of the metallurgical society of the American Institute of Mining, Metallurgical, and Petroleum Engineers was held at the Cleveland Hotel, Cleveland, from December 2 to 4. Three technical sessions on melting and pouring practice for steel castings were included in the programme.

Quality Control: The effect of various deoxidizers on cast steel; the joint effect of sulphur and rare-earth metals on the mechanical properties of a cast complex low-alloy electric-furnace steel, and melting practice to produce extra low-sulphur carbon, were dealt with in the first session.

Degassing: In the second session, gas solubility of iron and nickel-base alloys, ladle-to-ladle stream degassing, vacuum degassing of steels for aircraft uses, and foundry vacuum equipment, were considered.

Refractories and Gadgets: The third session dealt mainly with phosphate-bonded refractories for pouring-ladle spouts; high-alumina castable refractories for ladles, and gadgets and tricks used in foundry melting.

* * *

Electro Methods, Limited, announce the removal of their electrical connector division to new premises at Hitchen Street, Biggleswade, Beds. ('phone: Biggleswade 2086). The division manager is Mr. D. P. Wright.

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om work done by J. E. Wilson (project leader), and Shnay (manager), of the research and development on, Canada Iron Foundries, Limited, Toronto, Canada.

Notes from the Branches

Slough Section

During November, in the Lecture Theatre, High Duty Alloys, Limited, Slough section members of the Institute of British Foundrymen attended a meeting which was somewhat unorthodox in the choice of subject. Instead of listening to a paper on some technical aspect of the foundry industry, members were given a travel talk by Mr. A. R. Parkes with the title: " My Hungarian Tour." This meeting was also notable in that it was chosen by the London branch for the annual liaison visit by official delegates. The chairman at the meeting was Mr. H. J. Proffitt who, as vice-president, was deputizing for the section president, Mr. S. J. Williams, who was absent due to illness—those present wished him a very speedy return to full health.

Before calling on the lecturer, Mr. Proffitt welcomed Mr. J. Bain (London branch president) and his party from the parent organization. Mr. Bain said how pleased he was to be able to visit all the sections during his term of office; he felt that such visits did much to help the largest branch of the Institute to be the happiest. If he had the time to visit all the sections for both technical and social activities, he would have a very busy winter programme, but Mr. Bain said he felt sure that the effort would be well worthwhile. Mr. Proffitt then introduced Mr. Parkes, saying it was really superfluous to do so, as probably everyone present knew Mr. Parkes was a past-president of the section and both honorary secretary and junior vice-president of the London branch.

Mr. Parkes commenced his talk by explaining exactly how his Hungarian trip had come about. It was undertaken, he said, to deliver a paper sponsored by the IBF to the first Congress of the Hungarian Foundrymen's Association (a section of the Hungarian Metallurgical and Mining Institute). The paper he was nominated to prepare was entitled " Organization and Scope of the UK Foundry Industry," and he acknowledged gratefully the backing he had received from directors and colleagues of the FOUNDRY TRADE JOURNAL that had enabled him to visit Hungary to present the paper in person.

Mr. Parkes' colour transparencies and black-and-white pictures were of excellent quality and with their aid, he took his audience from London Airport to Hungary, *via* Brussels, took them on sightseeing tours of Budapest and its surrounding district, on visits to foundries and technical institutions inspected during the Congress, and then returned them to London, pausing at Vienna *en route*. The commentary, whilst touching on some of the outstanding technical points that the speaker had noted during the works visits and taken from the papers presented, consisted mainly of his impressions of the Hungarian way of life and how things differed from what is customary in England. It was very interesting to hear that Mr. Parkes was the only UK representative among the 300 or so delegates at the Congress (these being mostly from Eastern European countries in addition to considerable numbers of Hungarian foundrymen). He had been given a personal interpreter to assist him at every function attended during his stay, and this service was all the more valuable because the person chosen had an intimate knowledge of foundry practice. He was very impressed by the friendship and hospitality shown to him at all times while the guest of the Hungarians, the more so because it conveyed the feeling that British nationals generally and British founders in particular were well esteemed in Hungary and enjoyed a high reputation there.

After the talk, members were very eager to learn more and many questions were put to Mr. Parkes, some bearing on the Hungarian way of life being a little too complex for him to answer alone. Fortunately, he had invited a Hungarian friend to the meeting who was able to fill in the outlines. It was made clear that Hungarian foundrymen are working on about the same lines as those in other countries and much of what they lacked in modern high-production plant they were making up for by hard work and exercise of native ingenuity.

The meeting was closed by a vote of thanks to Mr. Parkes (and his Hungarian friend), proposed by Mr. J. P. P. Jones, who said it had proved a delightful evening; Mr. J. Wood seconded and the assembly warmly supported the proposition.

Lancashire

The December meeting of the Lancashire branch of the Institute was held at the Midland Hotel, Manchester, when Mr. H. Blackburn presented a paper on " Patternmaking for Jobbing and Mechanized Foundries," and made use of colour slides to illustrate his paper. The lecturer first outlined the techniques which he himself used, and then went on to assess the present trends in the patternmaking industry, with special reference to the use of resin patterns.

Discussion

From the discussion which followed, members learnt from Mr. Blackburn's replies that silicone oil, diluted, could be used as a release agent if sticking was encountered in stripping the plaster from wooden master-patterns; if, however, resins were cold-cured sticking should not occur. There was not usually any exothermic action with small epoxy resins when using a plaster mould, but PVA on top of wax could be tried to prevent sticking. It was necessary to wear gloves when making patterns, but there was not usually any risk of dermatitis from epoxy resins; there might be with polyesters, Mr. Blackburn thought. The patterns had a " gel " coat, and were laminated with fibreglass for strength; laminated patterns were more expensive. Laminations on polyesters had been tried, but stability and dimensional accuracy could not be guaranteed. As to the relative costs of resin and aluminium patterns, if a master was used there would be little or no difference. An experienced operator, he said, could make large patterns in epoxy resin, but with these exothermic reactions were sometimes encountered and, here again, experience would help. Referring to a wooden pattern he had shown in one of his slides, Mr. Blackburn said this had been rammed direct by slinging and added that no cambers were put in patterns by the patternmaker.

One member said he thought that more taper should be put into patterns and coreboxes when made from resin, and that he was of the opinion that iron patterns could not be beaten. He was interested to know why a fibreglass corebox had been made to produce a cylindrical core, when a " sausage " machine could have made the same core without any box at all. In reply, Mr. Blackburn said he agreed that more taper in patterns was desirable, and that a metal tube could have been used instead of fibreglass for the corebox. However, he thought that the type of foundry determined choice of what materials were used. The discussion was concluded with Mr. Blackburn saying that the advantages of using epoxy-resin patterns were that they were lighter in weight than other patterns, they would strip more easily, and duplication and repair was simpler. The meeting closed with a vote of thanks being proposed to Mr. Blackburn by the branch president, Mr. C. M. G. Wallwork.

South Africa

"Electric-arc Melting Practice" was the subject of the lecture presented by Mr. J. H. Martin, to the November meeting of the South African branch under the chairmanship of Mr. K. H. Coombs.

Mr. Martin dealt respectively with the linings, charge, melting and fettling. The actual hearth of the acid-lined furnace, he said, consisted of pure silica sand with a bond or a ready-mixed hearth material as supplied by refractory manufacturers, and both required approximately 5 per cent. moisture for ramming. Depending on the capacity of the furnace, there would be one or two courses of silica brick on the bottom and side walls, making a nine or 13-in. thickness. After hand charging with coke, he went on, the temperature would be brought up slowly to prevent any spalling during the critical temperature range of silica, *i.e.* atmospheric, to 400 deg. C. This period could be considerably shortened by preheating the roof over an open fire, while lining the body of the furnace. From 400 deg. C. the burning-in could be slightly accelerated until eventually the hearth was sintered, particular care being not to let the roof drip. The first heat should be a small wash heat to clean the furnace as it was likely that there would be a sulphur and phosphorus pick-up from the residual coke in the furnace.

Basic Lining

The basic lining of the furnace would have one to two courses magnesite on the bottom and side walls, continued in magnesite with backing brick to two courses above the slag line, the remainder being Cr.Mag. The hearth lining could be either tar dolomite or monolithic Crespi. Of the two, the Crespi lining was the superior and was quicker to instal as ramming time would be shorter and production could begin upon removal of the formers. The furnace would be hand charged to sill level and switched in immediately.

Charging

Mr. Martin stressed that when charging acid- or basic-lined furnaces it was important to ensure that the heaviest scrap was charged on the bottom of the hearth, followed by progressively lighter scrap until completely charged. When the electrodes bore through the scrap it was essential that there should be sufficient liquid on the bottom of the hearth to protect it from the actual arc. For ideal melting conditions the initial charge should have sufficient carbon content to induce a vigorous boil to eliminate gases.

Melting

The normal melting process of the acid was not as complex as the basic process, the author continued. After melting, the metal would be brought to a vigorous boil as quickly as possible and when the carbon was just below required specification, metal temperature and composition would be [illegible] followed by complete deoxidation and tapping. Basic melting, however, was more involved as all sulphur and phosphorus must be eliminated by boiling and slagging. Before charging approximately one to [illegible] per cent. [illegible] of the charged weight is charged on the hearth and with the high-lime slag formed at the beginning of the melt the phosphorus removal [illegible] immediately.

Fettling

The most vulnerable points in the hearth, said Mr. Martin, were the slag line and directly beneath the electrodes, and if possible the hearth should always be fettled after each heat before charging. Dead burnt dolomite for heavy fettling should not be coarse and should have plenty of fines.

Beds & Herts Section

The meeting of the Bedfordshire and Hertfordshire section, held on December 10 at K. & L. Steelfounders & Engineers, Limited, Letchworth, took the form of a liaison meeting with members from the parent organization, some six members making the trip to Letchworth. The speaker at the evening's meeting was Mr. T. C. Wilson (of J. Blakeborough & Sons, Limited) who took for his subject "Mould and Core Production by the CO_2 Process."

In his lecture, Mr. Wilson described the development of the CO_2 Process for moulds and cores and detailed how the Process was applied to mechanized coremaking, heavy cores, light and heavy moulding. He gave details of the sand mixes and detailed the effects of the various additives used. Blacking and gassing methods, equipment and its application to a variety of moulds were shown by a number of examples. Also included was a summary of practical and economic advantages of the Process, and details of labour analysis and material costs were given.

From the points the author made, some of the following were brought up for further discussion. On utilization of the Process, Mr. Wilson confirmed that present consumption of sodium silicate was about 4,000 tons per year for foundry purposes; he himself used about 15 tons per week. He incorporated about 10 per cent. reclaimed sand in his mixtures, having recently installed a plant for extracting such material from the knock-out, he said. For difficult pockets in large castings the author stressed the value of zircon sand to prevent burning-on; he also discussed the use of perforated rubber gassing tubes and perforated steel tubes and assemblies of tubes, the latter serving the dual purpose of mould or core reinforcement. Sometimes, he said, intentional over-gassing of the centre of a large core could be used to assist subsequent breakdown. After having operated the process for five years, his firm had saved over 10s. per ton of castings in raw material, up to 30s. per ton in labour charge on certain jobs, and there had been an overall increase in productivity of [illegible] per cent., all saving which partly offset some of the other increases foundrymen had had to contend with in recent years. When asked how much gas was needed for different jobs, Mr. Wilson explained that experience was the sole guide. He had had no trouble with [illegible] or reluctance of operatives to use the process; on the contrary, he had found that once the staff had appreciated [illegible] [illegible]

Mr. [illegible] K. & L. Steelfounders & Engineers [illegible] president, Mr. [illegible] [illegible] president [illegible] [illegible] a most interesting [illegible] meeting.

Company News

Webley & Scott, Limited, engineers and machinists, of Birmingham—The offer by Arusha Industries, Limited, to purchase the company's ordinary shares has been extended for acceptance until the expiration of two weeks after the publication of the next group accounts of Arusha.

Associated Engineering Holdings, Limited—The dividend is to be increased to 17½ (13⅓ equivalent) per cent. for the year to September 30, 1959, with a final of 12½ per cent. on a capital raised to £5,178,005 by a one-for-two scrip issue. Net profit increased to £1,523,506 (£1,231,433).

Cochran & Company, Annan, Limited, boilermakers and engineers, of Annan, Scotland—Mr. Robert Adeane, the chairman, told last week's meeting in London that a further reduction in the ordinary dividend might be necessary. It was hoped to limit this, however, to a small reduction in the rate of the ordinary stock and possibly only for one year.

Bilston Foundries, Limited—Mr. T. I. Hobart, the chairman, says in an interim report that trading conditions for the current year have kept up satisfactorily, but, unfortunately, production problems continue to affect activities. Troubles with new plant have restricted output and greatly increased unit costs. Plant modifications are being incorporated as quickly as possible, but the past few months' results will inevitably affect the profits for the year.

R. A. Lister & Company, Limited, agricultural, electrical, and general engineers and ironfounders, of Dursley (Glos)—Group net profit attributable to the company for the year to September 30, 1959, amounts to £587,309 (£487,512) after tax of £595,880 (£586,852). Following the doubling of the interim to 5 per cent., which was intended to reduce the disparity between payments, a final of 9 per cent. is recommended, making a total of 14 (12½) per cent.

Walmsley (Bury) Group, Limited, manufacturers of pulp and paper-making machinery, iron and non-ferrous castings, etc., of Bury—Under the terms of an agreement for the co-operation and exchange of information between the two companies, Beloit Iron Works, US, will subscribe 250,000 new £1 ordinary shares in the group at 110s. a share. Treasury consent has been obtained and permission is being sought from the London Stock Exchange to deal in, and for the quotation of, the new shares.

Tube Investments, Limited—At an extra-ordinary meeting last week a resolution was passed excluding the company's aluminium interests from the operation of the borrowing limit clause. Sir Ivan Stedeford, chairman, said that they now had membership in Reynolds Metals, the American company, and it was considered desirable that the aluminium companies should be separated from the rest of T.I.'s activities for the purposes of any borrowing. He added that the directors did not foresee any need in the immediate future for new finance for the company, other than possibly the aluminium concerns.

Indian Iron & Steel Company, Limited—The company states that the figure of £131,209, given as the net profit for the year ended March 31, 1959, in our December 4 issue is after the deduction of £750,000 from transfer to Development Reserve, a like amount having been written back, on the other side of the account, as allocation from works and ore mines new extension reserve. These transfers have been necessitated by the wording of the Indian Income Tax Act. The net profit as declared to the Stock Exchange is, in sterling, £881,209, against £884,864 for the previous year. Before arriving at the profit for the year ended March 31 last, the following sterling amounts were placed to reserve: Depreciation, £1,500,000; reserves, £2,360,032; taxation, £139,688.

Orders are still not easy to obtain, state the directors of **Aiton & Company, Limited**, pipework specialists and ironfounders, of Derby, in a review of the current year. Profit margins may be somewhat lower than they have been in the past, but the directors add that there is evidence that the company's capacity will be fully employed for some time to come. Results so far this year are satisfactory and there is no reason to suppose that the final dividend will be any less than last year's 6 per cent. A 4 per cent. (same) interim is being paid. Because larger generating units are being installed in electric power stations both in the UK and overseas, some extensions are being carried out to enable fabrication of somewhat larger and heavier steel pipe assemblies than were necessary in the past. The South African subsidiary is passing through a rather difficult period and it is not easy to obtain a great volume of work at present, it is stated. Nevertheless, the Port Elizabeth works is now fully employed, but the directors would like to be able to see further ahead than they can. Prospects for the Australian subsidiary are good.

Dividend of **John Summers & Sons, Limited**, the Shotton, Chester, steelmakers, is being increased from the equivalent of 10⅔ per cent. to 12½ per cent. with a final of 8½ per cent. for the 53 weeks ended October 3, 1959, on a capital raised to £20,250,000 by a one-for-two scrip issue. The directors state that they hope to announce a 6 per cent. interim dividend in respect of the current financial year. There was a 4 per cent. dividend paid for the past year. Group profits of the company, of which Mr. Richard F. Summers is the chairman, advanced from £12,554,521 to £13.436,12 in 1958-59, against which £2,592,330 (£2,416,340) is charged for depreciation calculated to the actual cost of fixed assets and £1,700,000 (£1,800,000) is allocated to fixed assets replacement reserve. Deducting interest of £695,138 (£699,777) and tax of £4,300,000 (£4,590,000), the net profit of £4,148,654 compares with £3,048,404, of which the ordinary dividend absorbs £1,550,388 (£1,242,000). The tax figures include investment allowances relief and over-provisions of £760,000 (£372,000) and a transfer of £280,000 (£830,000) to tax equalization account. The unappropriated profit of £2,463,516 (£2,124,001) with credits added of £444,097 is transferred to revenue reserve.

Latest Foundry Statistics

Steel Castings: In the November issue of *Iron and Steel Monthly Statistics*, published jointly by the Iron and Steel Board and the British Iron and Steel Federation, it is reported that employment in steel foundries on October 10 was 17,190 or 40 fewer than on September 5. The average weekly production of steel castings during this period was estimated to be 5,500 tons which is a definite improvement on the average for the first nine months of the year, 4,700 tons. The latter figure is apparently definite.

Copper-base Castings: Figures issued by the British Bureau of Non-Ferrous Metals Statistics show that the production of copper-base castings during October was 6,898 tons. This is distinctly higher than this year's monthly average of 6,085 tons. The Editor of the Journal estimates that the total for the year will exceed that of 1958.

xport Publicity Council

:sident of the Board of Trade has asked the
to act as members of the new Export Publicity
of which Mr. F. J. Erroll, Minister of State,
Trade, is chairman:—

P. S. Bache, managing director of Geo.
Company, Limited, makers of springs, weigh-
ines, etc., of West Bromwich, chairman of
pewriters, Limited, and a director of Crown
mpany, Limited (representing the National
Manufacturers); Mr. R. A. Bevan (Advisory
n Middle East Trade); Mr. S. Black (Institute
Relations); Mr. H. M. Braid (Incorporated
British Advertisers); Mr. W. P. N. Edwards.

ick Hamilton, chairman of Expanded Metal
Limited, and the Cressall Manufacturing
Limited, and a director of Henry Simon
), Limited, Renold Chains, Limited, Simon-
imited, and Lloyds Bank, Limited; Mr. N.
director of the Crown Diamond Paint Com-
nited, Canada, Wall Paper Manufacturers,
Walpamur Company, Limited, and subsidi-
ociation of British Chambers of Commerce);
.ubbock (British Latin America Chamber of
:); Miss E. Macdonald.

. Oughton (Institute of Practitioners in
g); Mr. Brian Rootes, a director and chair-
large number of companies in the motor-car
Dollar Exports Council); Mr. A. Wolcough
ng Association); Sir Walter Worboys, chair-
he Council of Industrial Design and former
al director of Imperial Chemical Industries,
Federation of British Industries); Mr. Lewis
TUC). The secretary of the Council is Mr.
:er, Export Publicity and Fairs Branch, Board
London, S.W.1.

BISF Appointments

:hard F. Summers, chairman of John Summers
Limited, will succeed Mr. Lewis Chapman
:nt of the British Iron and Steel Federation
y 1.

week's meeting of the Federation's Council,
les Reginald Wheeler, chairman of the Guest,
n & Steel Company, Limited, was appointed
elect of the Federation for 1960. Mr.
appointment as chairman of Guest, Keen
teel was announced recently. He has been
of the Council and the Executive Committee
SF and chairman of BISC (Ore), Limited, since
: is also chairman of the Federation's Inter-
Trade Relations Committee. Mr. Wheeler
esident of the British Cast Iron Research
on, and his directorships include Guest, Keen
olds, Limited, Associated Electrical Industries,
and George Wimpey & Company, Limited.

College for Greenock

in S. Maclay, Secretary of State for Scotland,
unced that the Admiralty are prepared to
cres of the boom-defence depot in Greenock
building of a new technical college. The
will be available about the end of 1961.
Town Council and Renfrewshire Education
e have been urging this for some time as
ut one acre is available at present on the
e Street site. Mr. John Crawford, director
ion in Renfrewshire, said that it would take
year to complete plans for the college.

Award of Trevelyan Scholarships

Trevelyan scholarships, tenable at Oxford and Cambridge universities and awarded to boys judged to possess exceptional personal qualities as well as the necessary intellectual ability, have been awarded for the second time. The scholarship trust was set up last year under the chairmanship of Sir Walter Benton Jones, chairman of United Steel Companies, Limited, when it was felt that a positive demonstration that personal qualities were as important as intellectual attainment might encourage boys to widen their interests and thus develop character and personality.

The scheme was sponsored by a number of well-known industrial concerns, among them Sir Walter's group, Associated Electrical Industries, Limited, English Electric Company, Limited, Guest, Keen & Nettlefolds, Limited, John Summers & Sons, Limited, Rolls-Royce, Limited, Steel Company of Wales, Limited, and Stewarts and Lloyds, Limited. Sufficient funds have been subscribed to permit the award each year of a number of three-year scholarships of £450 a year over a period of five years.

Not only do applicants have to subscribe to a fairly high standard of suitability from the academic viewpoint, but they also present an arduous and exacting task or project which they have undertaken and which is judged by experts in the particular field of the project, and they are also interviewed by representatives of the donor companies.

For the second selection 198 applications were accepted and 58 of these "short-listed." The awards this year have been increased by four to 23, but the selectors were impressed with the intellectual standard and personal qualities of the majority of the candidates.

SCOW's £30,000,000 Plan

Estimated to cost £30,000,000, a scheme to increase sheet supplies before the first of the two major strip mills comes into operation was announced last week by the directors of the Steel Company of Wales, Limited. Financing will come entirely from the company's resources, plus bank borrowing. This is the fourth new development plan for SCOW and increased production is expected to begin at the end of 1961. Crude steel capacity is to be raised to 3,650,000 tons and the sheet and tinplate plant is to be extended.

When the present £52,000,000 development plan is fully operational in the first half of next year, production capacity will be 3,000,000 tons of ingot steel a year. A smaller £5,000,000 scheme, announced earlier this year and principally concerned with the tinplate production facilities, is also intended to give an additional 250,000 tons of ingots a year. The new scheme will provide the additional 400,000 tons of ingots necessary to reach the target of 3,650,000 tons.

No further additions to coke ovens, blast furnaces, or steel melting shops are envisaged in the plant, but certain modifications will be carried out, in the light of experience already obtained, to give increased efficiency and performance.

The two main features of the scheme are the installation of a continuous casting plant for the production of slabs—the only large-scale plant of its kind in the UK—and the construction of a 48-in. wide hot strip mill.

David Brown Industries, Foundries Division, Penistone, played hosts to 350 children of their employees on December 12. Each child received a gift from Father Christmas. Members of the Penistone staff chaperoned the children.

Law Cases

Exposure to Pitch Dust

Holding that a craneman, Mr. David Kennedy Bell, had established that he was suffering from cancerous warts contracted through contact with pitch dust at work, Lord Cameron in the Court of Session, awarded damages of £1,750 against Mr. Bell's former employers, the North British Aluminium Company, Limited, a wholly-owned subsidiary of the British Aluminium Company, Limited. Mr. Bell sued for £5,000.

In his judgment, Lord Cameron said that after being employed by the company at its Fort William works for a year, Mr. Bell developed warts which were suspected of being cancerous and required eight operative treatments. Referring to a rota system laid down by the firm, Lord Cameron expressed the opinion that for a long time it was not operated and Mr. Bell was continuously exposed to pitch dust. He felt the plaintiff had succeeded in demonstrating that his employers failed to take a precaution which would have reduced the danger of exposure. He rejected the defendant company's plea of contributory negligence.

Grinder's Claim Dismissed

Claim for damages of £250 by a universal grinder against the Chesterfield Tube Company, Limited, for a cut thumb caused in an accident at the works was dismissed by Judge Sir Henry Braund at Chesterfield County Court. He awarded costs to the company.

Mr. Frank Plater (40) said he was sharpening a metal cutter on a machine at the works when a grinding wheel which he was using on the cutter seemed to "grab" and the cutter suddenly accelerated its speed and cut his thumb. He claimed negligence on the part of his employers in that it was part of his instructions to hold the cutter by hand.

The judge said that it was a very slight accident, with no residual complications. He found it difficult to say that an employer was negligent for having used in his factory a machine on which there had been nothing even remotely resembling an accident previously. "I think it is putting it altogether too high to say that there was any negligence." It was expecting too much for an employer to foresee such an accident.

Proof Lacking

A claim for personal injuries against the Power-Gas Corporation, Limited, of Stockton, failed at Middlesbrough on December 11. Mr. Joseph Newsham (29) claimed that gas escaping from a blast furnace caused him to become dizzy and fall 20 ft. while working for the Corporation on the construction of another blast furnace at Cargo Fleet Works, Middlesbrough, in April, 1957.

Judge Cohen, who gave judgment with costs for the corporation, said it was in September, 1957, that Newsham's solicitors wrote to the Corporation saying that an unsafe place of work was provided for Newsham at the time of the accident. If it had been said that Newsham was gassed, then it was extremely likely that records of gas tests made at the time would be available. The records had been destroyed because no one had asked the Corporation to keep them. Had the records been available he would have known who was right; as it was, proof that gas was the cause of the fall was sadly lacking. The judge added that anybody could make a mistake, "but Newsham's solicitors are experienced people."

Book Review

Steelmaking for Steelmakers, by A. Jackson, A.Met., F.I.M. Published by United Steels Company, Limited, 17, Westbourne Road, Sheffield 10; price £2.

There is a shortage of books which deal with practical steelmaking and it is therefore very pleasing to receive one on the open-hearth steelmaking process. Mr. Jackson, the author, is a well-known personality in the iron and steel industry in this country. He has a reputation for being progressive and is one of the pioneers of the basic open-hearth method of steelmaking in large melting units. He has a wide experience of steelmaking and he is always ready to place his knowledge and ability at the service of his colleagues in the industry. It is therefore not surprising to find a man of his great energy and knowledge making available a review of modern open-hearth methods and techniques to the practical men actively engaged in steelmaking in the form of a series of technical articles which he contributed to the journal of the Iron and Steel Trades Confederation "Man and Metal." The present book has been based largely on the technical matter originally appearing in this book, but it has been further reviewed and brought up to date. The general secretary of the Iron and Steel Trades Confederation—Mr. Douglass—in a foreword to the book indicates the very close and active association which has always existed between Mr. Jackson and the men who have worked with him in the melting shops at Frodingham.

Mr. Jackson has a very easy way of expressing his scientific knowledge and experience in relatively simple non-technical language, and in the book he develops very carefully a logical and detailed review of a basic open-hearth steelmaking process as practised in this country at the present time. He deals with the problem of refractories, of instrumentation and control, and gives an explanation of the theory of combustion and the importance of the flame in the open-hearth process. The book deals with the chemistry of steelmaking in a very clear and logical way, and yet in a manner which should be easily understood by those who have only a limited knowledge of chemistry. The author considers the important part that good casting-pit practice plays in the production of high-quality ingots and he also has a most interesting section on teeming. In a section which deals with works costs, he has endeavoured to give to the furnaceman some indication of how costs are built up and states some of the financial responsibilities which management must carry.

In the latter part of the book Mr. Jackson writes on the use of oxygen for steelmaking and makes many valuable suggestions which should be of help to the young technician when thinking about future of technical developments of the open-hearth steel industry. This is a most valuable book and should be in the possession of, and read by, all melting-shop managers. It will also be of great help to supervisors who are actively engaged in steelmaking and should be made available to sample passers and leading hands who work on steel plants. Mr. Jackson is to be congratulated upon writing an excellent and practical book and the industry is grateful to him for this valuable contribution to present-day knowledge.

F. COUSANS.

ON FRIDAY, DECEMBER 11, F. & M. Supplies, Limited, London, organized a dinner/dance to celebrate the 80th birthday of their parent concern. It was attended by approximately 130, almost exclusively members of the staff of the group, with their wives or other close relatives and the firms' agents. The function was held in the Abercorn Rooms and resembled nothing so much as a large "family party."

Company Meeting

Hale and Hale (Tipton)

PROGRESS IN A DIFFICULT YEAR

The 23rd annual general meeting of Hale & Hale (Tipton), Limited, was held on December 18 at Dudley, MR. R. C. LEPPINGTON (the chairman) presiding.

The following is an extract from his circulated statement:—

The year under review has been a most difficult one, but despite this your Company has made progress, and the position to-day is much healthier than it was this time last year.

The Group Trading Profit for the year ended August 4, 1959, amounts to £92,151, as compared with £93,689 for the previous year. The charge for taxation amounts to £19,566, as compared with £22,638, and there remains a consolidated Net Profit, after various adjustments, of £26,219, against £18,884, an improvement of £7,335. After deducting Dividends and Appropriations the balance carried forward is £26,627, as compared with £23,660 brought forward.

Shareholders have already been advised that the Company had a substantial holding of shares in the Midland Employers Mutual Assurance Company, Limited, and these shares were included in the Balance Sheet at cost price of £309. Since the date of the Balance Sheet these shares were exchanged for shares in Eagle Star Insurance Company, Limited, which were subsequently sold to produce a Capital Profit of £146,648. Your Directors recommend that a Capital Bonus of 3s. per share should be paid to the Ordinary Shareholders out of this Capital Profit, and the Balance will be retained for future development of your Company.

Since the relaxation of purchase tax on commercial vehicles in the last Budget, there has been a steady increase in our order-book. Within the industry demand is now overtaking productive capacity, and delivery dates are being continually extended. Although our foundries are now very busy, profit margins are insufficient when compared with the hazards of the malleable industry. We are still suffering from depressed selling prices, which are a legacy from the period of recession; but it is anticipated that with increased demand for our product, prices will rise to a more economic level.

The improvement in commercial vehicle output has acted as an impetus on other trades, and the demand in most sections of industry is increasing.

Your board feels confident of the future, and plans for the modernization and development of our plant are well in hand.

Subsidiaries

CHATWINS, LIMITED.—In company with other solid fuel manufacturers this subsidiary has experienced a continued falling-off in demand for most of its products, being largely brought about by the changing pattern in the domestic heating and cooking field. It is believed by the Management that great changes will occur in the solid fuel industry over the next few years and, in this regard, the possible entry into other fields of manufacture is under review.

J. & J. WHITEHOUSE (TIPTON), LIMITED.—This subsidiary is still experiencing difficulty in recruiting suitable labour, but despite this, it continues to hold its own. Cast-iron hollow-ware for the export trade is produced by the Company under the trade name of "Phœnix."

HALE ENAMELLERS, LIMITED.—This subsidiary has done remarkably well during the year resulting from greater diversification of production, and there appears to be no slackening off at the moment.

J. WAKEFIELD & SONS, LIMITED.—During the year we moved this subsidiary from Birmingham and accommodated it in the premises of Chatwins, Limited, at Tipton. Personnel has been changed, and we are confident that the future will bring worthwhile results. The company manufactures paraffin heating and lighting appliances.

The report was adopted and the final dividend of 15 per cent. (making 20 per cent. for the year) and the Capital Bonus were approved.

New Catalogues

Nozzles and Stopper-ends. Leaflet AE 66, issued by the Morgan Crucible Company, Limited, Wandsworth Works, Point Pleasant, London, S.W.18, makes some interesting and important claims for the company's Salamander and plumbago stopper-ends and nozzles. Whilst not wishing to be pedantic, the reviewer has always deemed stoppers—the word used by Morgan's—as being constituted of sleeves and stopper ends. It may be that nomenclature has changed since he was an active steelmaker.

Lubrication. Using the title "Molybdenum Disulphide in Action," K. S. Paul (Molybdenum Disulphide), Limited, Angel Road, London, N.18, have issued an illustrated brochure detailing—in the form of reports from users—dozens of successful applications for their materials. So far as the reviewer can see, however, there is no report from the foundry industry. Nevertheless, the business of manufacturing castings is not devoid of lubrication problems, and no doubt the perusal of these case-histories will be of interest to readers.

Non-metallic Building Goods. The Universal Asbestos Manufacturing group of companies, 8, Upper Grosvenor Street, Grosvenor Square, London, W.1, in issue No. 10 of UAM *Group Products*, describe, illustrate, and give the dimensions of a very wide range of asbestos-cement and plastic components destined for use by the builder. They include gutters and fall-pipes in a wide variety, as well as corrugated sheeting.

Hydraulic Variable-speed Gear. Publication No. AL50/1 recently issued by Carter Gears, Limited, Thornbury Road, Bradford 3, gives comprehensive details of type AL50 hydraulic variable-speed gears available in ten sizes, ranging from fractional up to 40 m.p.h.

Rayburn Window Display Competition Result

The first prize in the Rayburn window competition, organized by Allied Ironfounders, Limited, has been won by Thomas Danks (Retail), Limited, Nottingham. The prize offered can be either £500, or a cabin cruiser, or the professional services of a leading window-display consultant for six months. The second prize of £200 has been won by Clumber Builders' Supply Company, Limited, Mansfield, and the third prize of £100 is claimed by Thompson & Parkes, Limited, Kidderminster. Prizes of £10 each have been awarded to 20 runners-up. (A photograph of the panel of judges was published in the November 19 issue of the JOURNAL).

News in Brief

International Ferrox Company, Limited, is opening a new factory on the Holbrook Estate, Halfway, near Sheffield, for the manufacture of Vallak "hot tops" for ingot moulds. The hot tops are made from a mixture of coke breeze, sawdust and a binder, and are coated with a thin layer of refractory lining to prevent carbon pick-up. An exothermic coating may also be used.

The heaviest single piece of equipment for the iron and steel works in Durgapur, was recently despatched from the machine shops of the English Steel Castings Corporation, Limited, at Hawke Street, Sheffield, for Birkenhead *en route* for India. The anvil block is part of a seven-ton forging hammer which B. & S. Massey, Limited, Manchester, are supplying to the order of Davey & United Engineering Company, Limited, a member of the British consortium building the works.

Following a recent visit to Canada of Mr. Darby Haddon, chairman and joint managing director of W. H. Dorman and Company, Limited, Stafford, and of Mr. J. W. Whimpenny, joint managing director, and general manager, the company has been awarded a contract for a large number of "L" series diesel engines for power generation in connection with the new 600 channel 1,200 mile-long micro-wave telecommunications system stretching from Grande Prairie, Alberta, to the Yukon-Alaska border.

Presenting the prizes at the annual prize distribution of Rotherham College of Technology, Mr. L. W. Gummer, managing director of Gummers, Limited, valve manufacturers, Rotherham, said "The youth who sits back because he has got a certificate is not much value to himself or to an employer." Mr. Gummer presented a special prize from himself to Mr. Fred Sanders, who also won a silver medal as the best candidate of the year in the City and Guilds furnace brickwork first class final certificate examination.

Seventy-eight men will be made redundant by the closure on December 18 of the foundry and engineering department of Brown's Foundry, Limited, Derby. Announcing this Mr. W. J. Brown, managing director, gave the reason as increased competition during recent years. The closure will not affect the showrooms and building materials department, employing about 30 people. The company, which has been in existence for nearly 100 years, manufactures castings for the engineering and chemical trades and builders' requirements.

At a dinner in Birmingham recently, 52 employees, with a total among them of nearly 2,000 years' service with the Walsall firm of Elkington and Company, Limited, received gold watches. The presentations were made by Mr. W. E. Ogden chairman of the Delta group of companies, of which Elkingtons is an associate, and by Mr. W. W. Dolton managing director. Each recipient had more than 25 years' service with the company, the original factory of which, in Newhall Street, Birmingham, is now the Birmingham Museum of Science and Industry.

Deposits of over 100,000 tons of manganese-ore have been found near the village of Enyovche, in the Kirdjali district, Bulgaria. The ore which is near the surface, contains 35 per cent. pure manganese, and it is estimated that by the end of the year, 3,000 tons of ore will have been extracted. At Medet, near the Georgi Damyanov copper plant, large deposits of copper-ore containing molybdenum have been discovered. Bulgarian and Soviet experts are already drawing up plans for an opencast mine, a flotation factory and the extension of the copper plant.

Employees of the Hull excavator factory of Priestman Brothers, Limited, who had been on strike for five days, returned to work last week. The dispute started after time and motion-study experts were introduced into the machine shop to speed up production in an effort to cope with increased orders. The company has agreed to revert to normal pay rates which existed before the experts were called in. Later, new methods are to be discussed with union officials in the hope of increasing output. This was the first stoppage at the factory in the history of the 90-year-old family business.

An order for the first two furnaces for the new £10,000,000 development scheme of Steel, Peech & Tozer, Rotherham, has been placed with G. W. B. Furnaces, Limited, of Dudley, Worcestershire. With an internal diameter of 24-ft. they are nearly twice as large as any previously made in Britain, and will have a capacity of 150 tons. Each furnace will be able to melt at a rate of one ton per min. They will be of the German Demag swing-roof design and will be entirely of British construction, except for the regulator which has no equivalent in this country. The first furnace is planned to be in commission in January 1963.

Mr. G. E. D. Halahan, director and general works manager, of the Steel Peech & Tozer, branch of The United Steel Companies, Limited, presented prizes and awards to over 150 craft and technical apprentices at the firm's prize-giving at the end of last month. It was the largest number ever to have gained awards. Mr. G. W. Shield, headmaster of Mexborough Grammar School, said it was essential to develop the education of young people after they left school and industry had a very important task in this. Mr. R. Winder, the firm's education officer, said the company was considering the provision of an education centre to encourage young people to take a wider interest in the facilities offered for further education.

In his quarterly report, Mr. G. H. Watt, secretary of the local employment exchange, states that, although having an unemployment rate of 3.6 per cent., Falkirk and district has improved considerably in comparison with Scotland as a whole, which has now an unemployment rate of 4.3 per cent. The seasonal recession in the light-castings industry rose in some degree during the spring and early summer, but this was much less severe than in 1958. Under-employment in the foundries at the moment was virtually non-existent and had been so since early November. Mr. Watt points out that the number employed in the light-castings industry falls year by year, and says that in future years the industry's labour force may well fall to an even lower level.

Mr. John Strong, managing director of British Oxygen Gases, Limited, presented awards to apprentices and long-service employees at Robert Jenkins and Company, Limited, engineers, Rotherham, on December 3. Mr. A. R. Jenkins, chairman and managing director of the firm, who has recently come back from America, said that the United States standard of education at the age of 18 was not very far ahead of what it was here at 16. He said there were no apprenticeship schemes there and young people leaving school at 18 were expected to pick up a job by going and working at it. Less skill was required in most U.S. factories because of the amount of mass production. "They are machine minders and people who push buttons," he said.

Baker Perkins Foundry Machinery at work . . . *at Joseph Bloomer & Sons Ltd.*

This "Cadet" Rotary Table Shot Blast machine has been installed at Joseph Bloomer & Sons Ltd. where its high standard of finish and sound design have made it an extremely useful addition to this company's foundry equipment. The machine includes our patented bi-phase impeller system with low power consumption. No pits or special foundations were necessary. Please write for full details.

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HISTORICAL NOTE

Joseph Bloomer & Sons Ltd. were established in 1860. At their Ladysmith Foundry and Chain Works, which are in Cradley, Staffordshire, they produce a wide range of castings for gas and calor gas cookers, agricultural and textile machinery, the motor industry, continuous burning fires and stoves and many other applications.

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Personal

Efco, Limited, announce that Mr. George B. Cooke and Mr. J. S. Morton have been appointed to the board.

Mr. Alexander S. MacLellan is to retire from the board of Glenfield & Kennedy Holdings, Limited, on December 31.

Mr. Edward Heath, Minister of Labour, has appointed Mr. John M. Howard, M.P., to be his Parliamentary Private Secretary.

Mr. Stan Wood, editor of *The Stantonian*, the works magazine of the Stanton Ironworks Company, Limited, is to retire at the end of the year.

Mr. J. Wilcock has relinquished his post in the department of industrial metallurgy at Birmingham University to take up a position with Powder Metallurgy, Limited, London, W.1.

Mr. T. P. Everett has resigned from the boards of Richardsons Westgarth & Company, Limited, Richardsons Westgarth (Hartlepool), Limited, and Richardsons Westgarth Atomic, Limited.

Mr. K. P. James, M.I.B.F., is now appointed general manager of Tredomen Engineering Works of the National Coal Board. He was previously works manager, having held that position since 1953.

Mr. Frank Jamieson and Mr. Albert Masketer have been elected directors of Thomas Blackburn & Sons, Limited, ironfounders and general engineers, Preston. Mr. Thomas Blackburn has retired from the board.

Mr. T. Ramchandran has obtained the degree of *dokter-ingenieur* of the Technical University of Bergakademie Clansthal, West Germany. In the spring of 1961 he will be appointed to a teaching post at the Indian Institute of Technology, Madras.

Mr. A. M. White, a director of Bertrams, Limited, ironfounders and general engineers, Edinburgh, will retire at the end of this month. Mr. T. S. F. Melvin, managing director, has relinquished that post, but will remain on the board and has been invited to become chairman.

Mr. J. A. MacKinnon has been appointed joint managing director of Henry Gardner & Company, Limited, in succession to Mr. R. T. de Poix who has retired but remains on the board. Mr. MacKinnon has resigned as secretary and is succeeded by Mr. K. G. Hewson. All these changes take effect from January 1, 1960.

Mr. J. E. Hoar, chief technical engineer of E. D. Warburton and Company, Limited, Bury (Lancs), has been appointed a director of the company. The company have also appointed Mr. Leslie Durrant, development engineer with the Olives Paper Mill Company, Limited, as technical representative resident in the South of England.

The Group Statuary of Boulton, Watt and Murdoch, which stands outside the College of Commerce in Broad Street, Birmingham, has won for the sculptor, Mr. William Bloye, the Sir Otto Beit Medal for 1958-59. The award is made annually for the best work of art to be exhibited to the public in any part of the United Kingdom or the Dominions, outside London.

Mr. Warwick M. Dingley, aged 40, sales director of Stanley Works (Great Britain), Limited, joiners' tool manufacturers, Sheffield, has been appointed in charge of an organization established to handle marketing in Europe for all products manufactured by the Stanley factories in the United States, Great Britain and Germany. He will have the title, director of marketing, Europe, and will have headquarters in Zürich.

Mr. E. R. Dunning, until lately assistant works manager with the Midland Electric Manufacturing Company, Limited, Tyseley, Birmingham, has been appointed to the board of Metals & Equipment (Wolverhampton), Limited, as sales director. A student of Coventry Technical College and Birmingham University, Mr. Dunning served his apprenticeship with British Piston Ring Company, Limited; from 1947 to 1952, he was secretary of the Birmingham branch of the Institute of British Foundrymen and president in 1954.

Edgar Allen & Company, Limited, announce the following appointments to the boards of four subsidiaries:—British "Rema" Manufacturing Company, Limited: Mr. J. P. Lewis, Mr. W. G. A. Jenkins, and Mr. J. Higginbotham. Buell (1952), Limited: Mr. W. J. McBride and Mr. F. A. Ross. J. H. Humphreys & Sons, Limited: Mr. G. W. Turton, Mr. F. Haigh, and Mr. W. C. Garrison. Park View Steel Works, Limited: Mr. F. Haigh, Mr. G. C. Longden, Mr. W. H. Everard, and Mr. L. F. Keeley. Mr. D. F. Tiplady has been appointed secretary of Buell (1952).

Mr. C. W. B. Beagrie, director and technical sales manager of West Hunwick Silica & Wirebrick Company, Limited, Crook, Co. Durham, is leaving to join the board of G. P. Hinckley & Sons, Limited, Sheffield, on January 1, 1960. He will also be general sales manager of the associate companies, Hinckleys, Limited, Kingscliffe Super-Refractories, Limited, Hinckley Silica Sands, Limited, and Durhills, Limited. Mr. Beagrie commenced as an apprentice engineer with Synthetic Ammonia & Nitrates, Limited, now Imperial Chemical Industries, Limited, and was later with Head, Wrightson & Company, Limited, and General Refractories, Limited.

The Incandescent Heat Company, Limited, are seconding Mr. B. A. Harper to the staff of A.B.M.T.M. (India), Limited. His post will be that of senior furnace technician (India), and he will take to the company a specialized knowledge based on his 10 years' experience with the Smethwick firm, gained in the foundry plant division, development division, and the export division, where he was engaged on technical sales to the Indian market. As designers and builders of industrial furnaces, the Incandescent Heat Company, Limited, Smethwick, have supplied capital goods to India for almost half a century and throughout this period has been represented by A.B.M.T.M. (India), Limited, the manager of which firm is Mr. J. S. Halbert.

Obituary

Mr. Thomas William Shields, who was employed by the Eastwell Iron Ore Company for 50 years, has died at the age of 80.

The death has occurred at the age of 89 of Mr. Charles Bennett, a former director of the Wellfold Foundry, Limited, Clitheroe (Lancs).

The death is announced of Mr. Edward Roland Dunsby, who died on December 7, aged 44. He was sales director of G. Clancey, Limited, Halesowen, Birmingham, and had been with the firm for 14 years.

The death is reported of Mr. George Richard Sutton Darroch, who was assistant works manager at the Crewe Locomotive Works from 1917 until he retired in 1941. He was 79.

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R. J. LOVELL

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Circulation Manager: E. T. GRIFFITHS

District Representatives:
P. ELLIOTT
rthern Area)
'phone:
incham 1334

T. H. SMITH
(Scotland)
'phone:
Dumbarton 1046

D. C. RYALL
(Southern Area)
'phone: TRAfalgar 6171

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OHN ADAM HOUSE,
, JOHN ADAM STREET,
LPHI, LONDON, W.C.2
e: Trafalgar 6171 (*Private Branch Exchange*)
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Future of the Ironfounding Industry

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Dangerous Machinery—Contributory Negligence of an Employee who was Operating a Mill

By " Barrister-at-Law " 677

⁂

Pratique de la Fonderie de l'Acier.
Compte-rendu du procès-verbal de la cinquième conférence annuelle de la British Steel Castings Research Association, tenue en Octobre à Harrogate. Des détails sur le programme, et des extraits du discours du président sont suivis par un résumé des mémoires présentés. 667

Le Futur de la Fonderie du Fer.
L'état actuel de l'industrie de la fonderie du fer et son avenir sont étudiés dans un extrait de la " Edward Williams " conférence, présenté cette année à la conférence de l'Institute of British Foundrymen à Scarborough. Les statistiques données à l'époque ont été mises à jour. 673

Stahlgiesserei-Praxis.
Bericht über die Verhandlungen auf der im Oktober in Harrogate abgehaltenen 5.Jahreskonferenz der British Steel Castings Research Association. Nach Einzelheiten des Programmes und einer gekürzten Fassung der Ansprache des Vorsitzenden, folgen Kurzauszüge der gehaltenen Vorträge. 667

Die Zukunft der Eisengusserzeugung.
In einem Auszug aus der in diesem Jahre auf der Scarborough Konferenz des Institute of British Foundrymen gehaltenen Edward Williams Vorlesung werden die gegenwärtige Lage der Eisengiessereiindustrie und ihre Aussichten für die Zukunft betrachtet. Die damals vorgebrachten Statistiken wurden auf den heutigen Stand gebracht. 673

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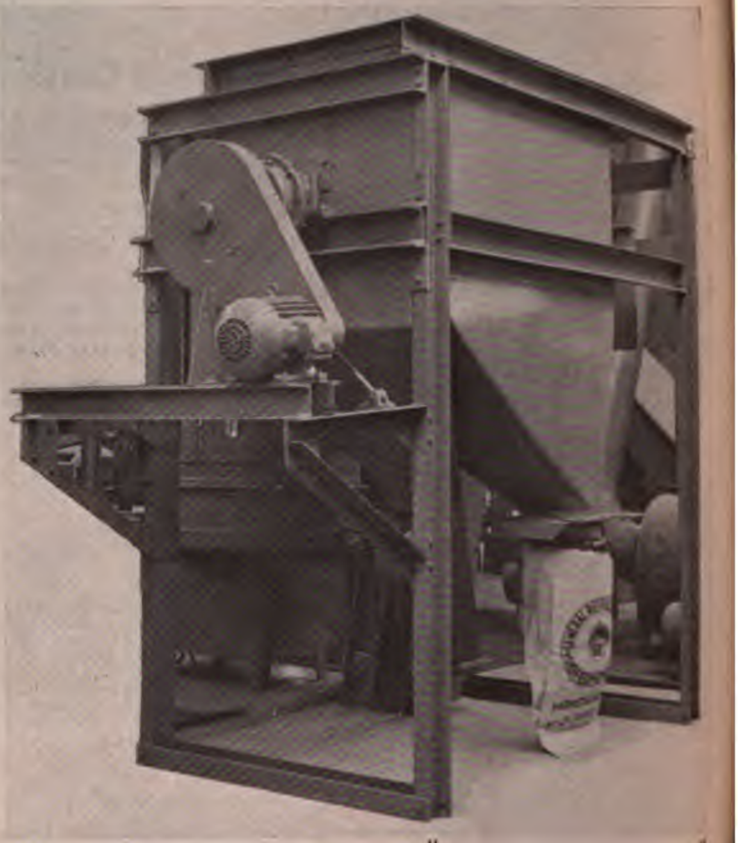
SHELL MOULDING

Sand Precoating Plant



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Photograph shows typical demonstration plant as displayed on cur Stand at BINGLEY HALL, BIRMINGHAM during May 1959.

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FOUNDRY
TRADE JOURNAL
Vol. 107 DECEMBER 31, 1959 No. 2247

Fewer American Foundries*

The American journal, *Foundry*, reviewing the biennial publication of *Penton's Foundry List*, is of special interest. It discloses the shutting in the Americas, in two years, of no fewer than 235 foundries; 208 of these made grey-iron castings. This year there were 2,370 iron foundries listed, whilst 50 years ago there were 5,000 and, we would say, about the same proportion holds good for this country. The total number of American foundries is given as 6,085—a figure which refers to plants and not companies. The decline in numbers extends to steel foundries (if precision shops, where there is a gain, are excluded), aluminium, brass and bronze, as well as iron foundries, although gains have been shown in die-castings foundries and those engaged in magnesium castings production, the increase in number of the latter representing no less than 70 per cent.

The review includes a graph of current coremaking practice, from which it would seem that approximately 1,200 foundries are using the CO_2 Process for this purpose (760 for mould making); 750 are using self-curing cores and about 570 the shell process. Shell processes have gained appreciably on the North American Continent, and the CO_2 Process, not previously included in the statistics, is now used in 759 foundries for moulding and 1,283 for coremaking. These foundry processes are set out in a graph, where " permanent mold " (that is, gravity-die) castings are separated from " die-castings " (that is, pressure-die-castings). The review also contains a note that the number of cupolas, open-hearths, converters, and air furnaces (reverberatory) is decreasing, whilst arc and induction furnaces, other reverberatory furnaces—probably a modern English type—and non-crucible furnaces are gaining.

Mr. Frank G. Steinebach, commenting editorially in *Foundry* on these statistics, wisely states " The trend towards a smaller number of foundries continues. Production statistics and information on new foundries and mechanization and modernization of existing plants show, however, that the production capacity of the foundry industry has not been effected by these losses. The industry probably is capable of producing a greater tonnage of castings yearly than at the end of World War II." We would add the comment that as gains are being shown in die-castings, precision and magnesium castings, that the value of the output is steadily increasing. There is plenty of life in the old dog yet!

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* Statistics relating to UK iron foundries are recorded on pages 673 to 676 of this JOURNAL.

Durgapur Steelworks

President of India performs Opening Ceremony

On Tuesday, December 29, the President of India, Dr. Prasad inaugurated the first blast furnace at the Durgapur steelworks, in West Bengal. This works represents the largest single export order ever obtained by Great Britain. The contract, to the value of £105,000,000, is being carried out for Hindustan Steel, Limited, by the Indian Steelworks Construction Company Limited (ISCON), the consortium formed specially for the purpose. The ceremony celebrates the inauguration of an integrated steelworks and not just the completion of one blast-furnace. The coke ovens are complete with a coal washery, and by-products plant. The blast-furnace is complete with a gas-cleaning plant and pig-casting machine. The power plant is complete with all its standby units. In addition the central engineering maintenance department, foundry and stores department are very largely complete.

Durgapur is a joint Indian/British effort and approximately 50 per cent. of the capital expenditure and tonnage of raw materials has been supplied by India herself. Of the 33,000 labour force on the site, the vast majority are Indian; this includes a high proportion of skilled Indian supervisors. The number of British technicians working at Durgapur is, in fact, under 400.

In order to provide for the operation of the steelworks, 350 Indian technicians are being trained through the Colombo Plan in the United Kingdom. Others are being trained in Australia, the USA and other countries. In addition, the British Iron & Steel Federation have seconded technicians from this country to Hindustan Steel Limited, to assist in the initial operation of the steelworks and to complete the training of the Indian technicians.

The members of ISCON are 13 of the most famous firms in British industry. They are:—Davy and United Engineering Company, Limited; Head, Wrightson & Company, Limited; Simon-Carves, Limited; Wellman Smith Owen Engineering Corporation, Limited; Cementation Company, Limited; British Thomson-Houston Company, Limited; English Electric Company, Limited; General Electric Company, Limited; Metropolitan-Vickers Electrical Company, Limited; Sir William Arrol & Company, Limited; Cleveland Bridge & Engineering Company, Limited; Dorman, Long (Bridge & Engineering), Limited; and Joseph Parks & Son, Limited.

The Durgapur works also includes considerable facilities for foundrywork. Plans for these were outlined in the JOURNAL recently and details will be included in a future issue.

National Society of Master Patternmakers

A visit to the works at Trafford Park, Manchester, of Associated Electrical Industries (Manchester), Limited (formerly Metropolitan-Vickers Electrical Company, Limited) has been arranged for members of the National Society of Master Patternmakers to take place on January 19, 1960. The visit will be preceded by luncheon at 12 for 12.30 p.m., at the Princes Restaurant, Oxford Street, Manchester, the cost for the luncheon being 12s. 6d. per head. Since the number attending is to be restricted to 20, places will be allocated in order of receipt of applications, which should be sent *not later* than January 11 to the secretaries. Fisher & *Firkins, 12, Cherry* Street, Birmingham.

Forthcoming Events

JANUARY 5

Institute of Metals

Oxford local section:—"Brittle Fracture," by Prof. N. J. Petch, 7 p.m., at the Cadena Café, Cornmarket Street.

Institution of Plant Engineers

Edinburgh branch:—"Practice of Thermal Insulation," by Mr. Andrew and Mr. Angus George, 7 p.m., at 25 Charlotte Square.

Institute of Welding

Christmas lecture to young people—"The Magic Arc," by Professor Hugh O'Neill, at 54, Princes Gate, London, S.W.7. (Admission by ticket.)

JANUARY 5 to 7

Institution of Mechanical Engineers

Symposium on "Recent Mechanical Engineering Developments in Automatic Control." (Details from secretary.)

JANUARY 7

Leeds Metallurgical Society

"Modern Developments in Metallurgical Analysis," by K. M Bills. (Details from secretary.)

Institute of British Foundrymen

Stoke-on-Trent section:—"Improvements in Surface Finish, Inspection and Fettling of Grey-iron Castings," by L. Clarke, 7.30 p.m., in the Stipendiary Court Room, Hanley Town Hall.

JANUARY 8

Institute of British Foundrymen

Tees-side branch:—"Ingot Moulds—A Critical Survey," by K. G. Harris, 7.30 p.m., in the Teesdale Hall, Head Wrightson & Company, Limited, Thornaby-on-Tees.

JANUARY 9

Institute of British Foundrymen

West Riding of Yorkshire branch:—Dinner/dance, 6.30 for 7 p.m., at the Midland Hotel, Bradford.

Scottish branch:—"Theory and Practice of Sand Slinging," by Robert Kennedy, 3 p.m., at the Royal College of Science and Technology, George Street, Glasgow.

Newcastle and district branch:—"Production of Aluminium Castings," by J. Vickers, 6 p.m., in the Neville Hall, Westgate Road, Newcastle-upon-Tyne.

Correspondence

"INSUFFICIENTLY-ADDRESSED" LETTERS

To the Managing Director,
Steel & Iron Foundry, Limited,
Covent Garden, London.

SIR,—Your 1959 calendar which was received at the beginning of the year, has been greatly admired by all that have had occasion to visit our office, some more frequently than others. If it is not asking too much, we would appreciate a copy of your 1960 calendar. Wishing you a very Happy Christmas and a Prosperous New Year.—Yours faithfully,

JOHN S. CARD.

CPO J. S. Card,
Submarine Escape Instructor,
4th Submarine Squadron,
Balmoral, Sydney, N.S.W.
Australia.

December 14, 1959.

* Quite a large number of "insufficiently-addressed" letters arriving at the Editorial office of this JOURNAL (which used to be in Covent Garden) can be diverted to their correct destination, but the one reproduced above "has us foxed"—to use an idiom believed to be quite customary in submarine activity. Thus through publication of the letter, the intended recipient is invited to reply. It would be a pity to disappoint our friends from "down under."—EDITOR.

eelfoundry Practice

ceedings of the Fifth Annual Conference of the
ish Steel Castings Research Association, last Autumn

Over 70 per cent. of the total membership was represented by more than 160 delegates to the British Steel Castings Research Association's fifth annual conference, the theme of which was "Steelfoundry Practice." The gathering took place at Harrogate late in October, and was held under the general chairmanship of Dr. R. Hunter, the chairman of the Association. The conference was divided into five technical sessions, a special feature being a film entitled "Some Continental Uses of the CO$_2$-Process" shown by Ing. Dr. C. Petrzela of the State Research Institute for Materials and Technology, Brno, Czechoslovakia. What follow are brief accounts of the general arrangements, extracts from the chairman's opening remarks and brief summaries of the papers presented.

e fifth annual conference of the British Steel ngs Research Association, held at the Hotel stic in Harrogate on October 22 and 23, dealt ly with practical steelfoundry operating tech- s. Details of the programme, extracts from hairman's address, and synopses of the papers nted are given in what follows.

PROGRAMME DETAILS

the morning of October 22, the conference ed with introductory remarks by Mr. R. er, B.SC., PH.D. (chairman of the BSCRA cil). The conference chairman, E. Gregory, (chairman, research committee), then gave ddress (extracts from which are given later in rticle). This was followed by a paper entitled tures of the Association's Research Pro- me," given by A. H. Sully, PH.D. (director of rch). After lunch, the chair at the first session theme of which was "Methods Control,"— taken by Mr. F. Cousans (chairman, foundry ice advisory committee). Mr. R. Bygrave on & Company, Limited) then presented his r, "Operation and Value of a Foundry ods Section," which was followed by a discus- Afternoon tea was followed by session 2, e theme of "New Developments," the chair taken by Mr. H. W. Keeble (K. & L. Steel- ders & Engineers, Limited). The paper ntinental Uses of the CO$_2$ Process" was then by Ing. Dr. Petrzela (State Research Institute Materials and Technology, Brno, Czecho- kia). Following the discussion on this, two er papers: "Air-hardening Bonds for Mould- ands," by J. M. Middleton, A.MET., A.I.M., and wnes, B.SC. (BSCRA), and "Mould Paints and es," by J. M. Middleton, A.MET., A.I.M., and McIlroy, B.SC. (BSCRA), were presented. iday, October 23, commenced with session 3, Mr. C. H. Kain, M.I.MECH.E., F.I.M. (Lake & t, Limited), in the chair, the theme being ting and Feeding". Mr. A. Pearson (Clyde Steel Company, Limited) presented the "Gating and Feeding of Small Steel Cast- " and Mr. A. P. Riley (Darlington Forge, Limited) "Gating and Feeding of Large Steel Castings," both of which were discussed by the conference. Session 4, on the theme "Moulding," followed morning coffee, with Mr. S. L. Finch (Catton & Company, Limited) in the chair. The paper "Use and Abuse of Moulding Machines" by C. M. Stoch, DIPL. ING., and F. Bownes, B.SC. (BSCRA), was then given, followed by "Application of Sandslingers in Steelfoundries" by M. C. Lloyd, M.B.E., and W. L. Beasley (F. H. Lloyd & Company, Limited), both papers being discussed. The final session, following lunch, had the theme "Patternmaking," with Mr. G. Shaw, C.B.E., M.A. (W. Shaw & Company, Limited), in the chair. Mr. H. G. C. King (British Transport Commission, Crewe) then presented "Developments in Patternmaking." Following the discussion on this paper, the conference chairman wound up the proceedings.

CHAIRMAN'S ADDRESS

In the course of his opening remarks at the conference on the Thursday morning, Dr. R. Hunter, the chairman, said this was the fifth annual conference to be held and the first over which he had been privileged to preside, following his election to the chairmanship of the Council last July. After welcoming all present at the meeting, Dr. Hunter made special mention of Mr. C. H. Kain, who had acted as chairman at all the Association's previous conferences, and placed on record the members' deep appreciation of all that he had done over the past five years. Dr. Hunter also said how sorry he was that Mr. F. N. Lloyd, who was chairman of BSCRA from its birth until 1950, was unable to be present, and he also regretted that Dr. C. J. Dadswell, chairman of the British Steel Founders' Association, had at the last moment been prevented from attending.

The precedent established last year of inviting to the conference a distinguished guest from overseas had again been followed, and this time Dr. Hunter extended a warm welcome to Dr. L. Petrzela of the State Research Institute for Materials and Technology at Brno, Czechoslovakia. Dr. Petrzela was a pioneer of the CO_2 Process, Dr. Hunter said, and those present were looking forward very much to seeing his film. Dr. Hunter also made mention of the absence at the conference of Dr. E. Gregory, chairman of the Association's research committee, and suggested that good wishes be sent to him for a speedy recovery to full health. Next, the chairman welcomed Mr. W. S. Scott of Darlington Forge, Limited, who, at the Association's last Council meeting was elected vice-chairman.

Attendance at the conference was up to previous standards, Dr. Hunter said, the total number of participants being about 174. Turning to the programme of the conference, he said that, in addition to the lecture to be given by Dr. A. H. Sully and Dr. Petrzela's film, eight papers were to be presented and discussed. Five of these had been contributed by the industry which the Association served, and three by the Association's investigational staff. This blending of industrial experience with the publication of the results had been a regular, and much appreciated, feature of BSCRA conference programmes, as it ensured a balance between laboratory development and shop-floor practice.

Scope for Improvement

The percentage of the industry's total cost of production which was expended in costs directly allocated to the moulding and coreshops was probably of the order of 15 to 20 per cent., Dr. Hunter said, but the effects of error in foundry practice were, as everyone realized, very far-reaching, and caused wastage in melting, cleaning and dressing, heat-treatment and machining to the extent of perhaps many times the cost of moulding and coremaking. It was therefore pertinent at this conference, Dr. Hunter said, to consider how, by improvement of foundry methods, control and supervision, the industry's performance could be improved. These improvements would undoubtedly cost money, he said, but it should be remembered that a reduction in the level of scrap and rectification costs could result in quite considerable savings in the total cost of manufacture. He felt that many founders could benefit from increased supervision in the shops and development in their moulding and coremaking practice.

Dr. Hunter then went on to say that founders must also bear in mind their responsibility for improving the quality of castings. In collaboration with the British Steel Founders' Association, Dr. Hunter said that the BSCRA had recently established a steel-casting development committee whose function would be to provide and disseminate data to engineers and which it was hoped would result in an extension of the use of steel castings. Some of the difficulties confronting steelfounders in the development of additional markets related to criticisms from engineers in regard to price, quality and delivery of the industry's products. Dr. Hunter said that the industry's moulding and coremaking departments must take their fair share of responsibility for this state of affairs; quite clearly the activities of this new committee, which was addressing itself to present and potential customers, was going to be frustrated if those on the production side did not ensure that their products lived up to the enhanced reputation which this committee was seeking to establish.

An Important Contribution

The Research Association was formed to help the steelfounding industry to improve its technical standards, he added, and there was much evidence to suggest that it was now making an important contribution to this end. This was being achieved not only through its research programme, but by its advisory services, which were available to all members. At the Association's research station, a team of some 18 graduate investigators was engaged solely upon the problems of direct interest to steelfounders, and supported by a first-rate library and information service. With the additional financial backing recently secured from the Department of Scientific and Industrial Research, it was hoped to arrange for these senior members of the Association's staff to make more-regular visits to member foundries in the near future, Dr. Hunter said. Members would be kept informed of the latest results of research, and he urged members to take full advantage of the Association's facilities in helping to solve any problems they may have. It was only by the closest liaison between the Association and practical steelfounders that the fullest benefits could be achieved and expenditure on research justified.

With these remarks, Dr. Hunter said he had much pleasure in opening the conference and then called upon Dr. Sully, director of research, to present his lecture on "Features of the Association's Research Programme."[*]

SUMMARIES OF PAPERS

Summaries of the papers presented during the technical sessions are given in what follows.

Operation and Value of a Methods Section

By R. Bygrave (Catton and Company, Limited.)

In this contribution the author explained the organization and function of the methods section in the company with which he is associated:

Here, the duties of the section commence with the receipt of an enquiry. Each drawing is carefully perused, and any modifications to the design which are considered necessary in order to produce a sound casting are clearly marked, and the drawing subsequently returned to the customer. By this means the foundry-methods personnel maintain close liaison between the founder and customer, which contributes to the appreciation of the problems of both parties and invariably results in the establishment of co-operative relationships. (Simple examples of re-design which had produced a sounder casting, and which had simplified the work of the founder, were now cited in the Paper.) A

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[*] Salient features of the current research programme were contained in the annual report of the Association, printed in this JOURNAL, October 8, 1959.

t amount of experimental work has been
ed out by the section on gating and feeding
ll types of castings, and the experience gained
ı these results is invaluable for eliminating
ng defects such as sand and slag inclusions, etc.

Foundry Process Sheet

:ter deciding on the gating and feeding system,
which parts require chilling, etc., the com-
method of manufacture is recorded on a
dry process sheet. A master isometric sketch
epared for all castings to be made in the job-
section, and a copy of it attached to the
:rn prior to its being sent into the foundry.
positions of feeder-heads and runners are
painted on the pattern by the methods sec-
to give the moulder positive direction as to
method to be employed. Sample castings are
e in many cases, and a complete record is
of each sampling stage from the time the
:rn is received to the time it passes through
inal inspection stage. Should the sample cast-
oe rejected then the method of manufacture is
ed, the alterations being recorded and a sec-
sample put in hand with the minimum of
/.

Close Control of all Processes

constant watch is kept on all stages of manu-
ıre, and here the co-operation of the shop
nan is essential in seeing that moulds are well
ned, cored up and closed correctly. An aid to
ling confusion in the coreshop is the addition
/es to the various sands, so that the coremaker
distinguish between them more easily.
ıods-department personnel make frequent
; to the dressing shop in order to check any
ɔle that may arise there. All rejected castings
:xamined and analyzed by the methods section
this manner the personnel of the department
at their fingertips a complete record of the
ry of all the castings the foundry has pro-
d. Thus, the methods section is now the
·ve centre" of the foundry, and is constantly
uch with all the problems involved. (Conclud-
ıis paper, the author exhorted all foundrymen
tablish their own methods department, so that
advantages described, *e.g.*, improved casting
ty, simplification of production, etc., would
fit the steelfounding industry as a whole.)

·hardening Bonds for Moulding Sands

J. M. Middleton, A.Met., A.I.M., and F.
Bownes, B.Sc., L.I.M. (both of BSCRA)

r-hardening bonds have been employed in
dries for a number of years, *e.g.* Portland
nt in the Randupson process, as have various
.tes and phosphates which give air-setting
:rties when mixed with sands. The main dis-
ntages of these binders is their poor breakdown
:rties after casting, and the fact that they air-
:n slowly, which necessitates long periods of
ng before the moulds can be cast. Recently, however, several new organic binders have been developed that are suitable for either core or mould manufacture, since they are effective when clay is present in the mix, developing good green-strengths and retaining their air-hardening properties. (The properties of three such typical oils, all proprietary, are described in the Paper, including the green-strengths obtained with oil-bonded sands having various clay and natural-bonded-sand additions. The air-setting properties and baked strengths of oil/clay/sand mixes, and some indication of their bench "life" are also quoted.) Typical properties obtained with the addition of 3 per cent. oil, 3 per cent. clay and 0.1 per cent. accelerator are as follow:—green-strength 3 lb. per sq. in.; air-set compression strength after 24 hr. 330 lb. per sq. in., and a tensile strength when baked of 310 lb. per sq. in. The rate and volume of gas evolved during the breakdown of oil mixes after pouring may be higher than that from normal oil-sand mixes, and probably accounts for the blowhole defects sometimes encountered when using these special oil-binders.

Advantages and Disadvantages

(The foundry application of oil binders was now discussed, the binders being used in two ways: (*a*) as a binder in facing-sand mixes, and (*b*) as a spray (when suitably diluted) on the mould face.) Advantages claimed when using these binders are: Good "strip," especially with the higher-alloy steel castings; good dimensional accuracy; prevention of sand inclusions, and reduction of stoving and handling costs. Disadvantages are: The high cost of binders; the need for much closer control than with normally-bonded sands; sensitivity to variations in air temperature and humidity, and a possibly greater risk of blowhole defects in the castings.

Mould Paints and Washes

By J. M. Middleton, A.Met., A.I.M., and P. G. McIlroy, B.Sc. (both of BSCRA)

This paper describes an investigation into the properties of mould paints and washes for steel-foundry purposes:

Two main aspects of mould paints have been studied: (*a*) the room-temperature properties, and (*b*) the high-temperature properties. The room-temperature properties investigated were: the suspension properties, *i.e.*, the effectiveness of various types and amounts of suspending agents; the relationship between the paint consistency and specific gravity; the dry film thickness, and the extent of paint-sand penetration. The susceptibility of the paint film to cracking during drying, and the friability of the paint film when dried, have also been investigated. As a result of this work, it has been possible to arrive at formulations for suitable mould paints, *i.e.* paints which have suitable consistency and satisfactory suspension, which dry to give a hard film, and which are free from drying cracks. It has been shown that the susceptibility to cracking during drying, besides being related to the paint composition, is also affected by the condition of the underlying sand, *e.g.*, sand having a low ramming density or a low dry-strength can give rise to cracks in the paint.

Use of Special Test Casting

High-temperature shock tests and metal dip tests were carried out on a series of paints, a novel form of test casting being employed in which high ferrostatic pressures were simulated by the application of compressed air to the solidifying casting. These tests showed that the composition of the underlying sand is important. If the sand does not crack when subjected to thermal shock heating, then a similar compact painted with a suitable mould wash will also show no visible cracking. It has also been found that if normal drying cracks are observed, then subjecting the painted sand surface to radiant heat may cause the paint film to spall away completely from the underlying sand. Only the higher refractory washes were effective in preventing metal penetration, whereas those washes which caused a sand/wash reaction were not. Thin coats of paint offered virtually no resistance to high ferrostatic pressures, but, providing the base sand and paint does not crack, a thick coating of a refractory paint gives a very high resistance to metal penetration. Paint formulations are suggested which can be applied as one coating to give very thick films free from cracks, and which have high resistance to metal penetration.

Gating and Feeding of Small Steel Castings

By A. Pearson (Clyde Alloy Steel Company, Limited.)

This was essentially a practical paper, in which the author illustrated a wide variety of methods of gating and feeding which are employed in the foundry with which he is associated:

Before considering specific examples of gating methods, the general principles that should be applied are surveyed. These are concerned with the positions where metal should be introduced into the mould, and the dimensions and design of the running systems, and their protection by refractory sleeves or tiles. The general rules adopted to give efficient feeding are described, and the sizes of heads to feed various sections, *e.g.*, flanges, rings, plates, bars, etc., are given. The use of exothermic aids to feeding is discussed, and it is suggested that exothermic powders are most suited for castings of fairly large mass having one or two feeder-heads, exothermic sleeves being more suited to castings with a number of smaller heads. Sleeves are also very efficient when they incorporate a knock-off core, since very hot steel is available within the head and the knock-off core is super-heated; this enables core apertures to be reduced below normal size. A large number of examples are given of methods of gating and risering used with a wide variety of castings. These include small shell-moulded castings in plain and high-alloy steels, and larger, very complicated castings, *e.g.*, pump casings which are subjected to high test pressures.

Premature Freezing-over

The author is of the opinion that many of the shrinkage defects found at corners, and at small cores remote from the feeder-heads, are due to premature freezing-over of the feeder-heads preventing the atmospheric pressure from operating on the head. By this means a partial vacuum is formed in the riser cavity—many mould conditions, *e.g.*, small cores and sharp corners of sand within the mould, can create local atmospheric cores where serious shrinkage may occur. The author overcame this kind of defect by inserting true atmospheric cores in all heads, even open ones, the cores being placed horizontally and at a distance of approximately two thirds up the feeder-head.

Gating and Feeding of Large Steel Castings

By A. P. Riley (Darlington Forge, Limited.)

The author does not purport to lay down a set of rules for the gating and feeding of large steel castings, but rather to draw attention to certain facts, and to mention certain changes that can be made to improve soundness and freedom from defects. These changes include improvement in design and additional aids to natural atmospheric gravity feeding:

Certain vital factors must be borne in mind when considering the production of large castings. Amongst these is the high cost of moulding when compared with that of the molten steel. The risks entailed in the production are large—small savings in moulding time, or skimping of moulding materials, can easily result in a scrapped casting or danger to personnel. Most heavy castings have heavy duties to perform, and should be as sound as human ingenuity can make them. Downgates are usually standard, speed of pouring being determined by the number of downgates and the ladle nozzle size. Modern moulding materials are such that they will withstand much more "wash" than hitherto—as a result, top running can quite often be used, with greatly improved results as regards feeding. As a general rule, the slower the casting is poured, the better, as quick pouring almost always results in certain defects being produced.

Feeder Heads

The factors which govern the positioning of feeder heads are discussed, *e.g.*, feeder heads must be positioned to allow easy moulding, and must not hinder the contraction of the casting. The casting must be moulded so that heavier sections are at the top, and the heads positioned so that they can be easily removed by burning, etc. A number of examples are given of the percentage of feed metal required for castings of various designs. This can vary enormously with the type of casting, compact solid pieces or symmetrical thin-section castings generally requiring a lower percentage of feeder metal. The various aids to natural feeding are also described. Natural atmospheric heads suitably kept open by various means rod feeding, and the addition of insulating ildly exothermic materials are preferable, and e simplest to use. Other additional feeding re: after-feed heats, electric-arc feeding, and ermic metal additive compound additions. -feed heats are probably the most effective, ermic sleeves being limited since they cannot ed on very large heads. Exothermic metal d powders are better than sleeves, since they e added at timed intervals, but they too have n disadvantages. Electric-arc feeding is an method for feeding compact pieces, but on lex castings practical considerations restrict its

and Abuse of Moulding Machines

M. Stoch, Dipl. Ing., F.I.M., and F. Bownes, B.Sc., L.I.M. (both of BSCRA)

is paper is based on experimental work carried y BSCRA in investigating the two main factors affect the quality and consistency of machine- moulds, namely, the compaction charac- cs of the moulding machines, and the proper- f the moulding materials:

is often observed, when examining castings achine-made moulds, that the defects encoun- are associated with the non-uniform compac- f moulding sand. Therefore, special attention een given in the work to measurement of hardness, etc., in those places which are lt to compact. The uniformity of compaction re important than just a local high hardness. rtunately, however, some parts of the mould to be compacted excessively, so that other reach some degree at least of compaction ugh this is often inadequate). Jolt/squeeze, hockless simultaneous jolt/squeeze, moulding- ines have been tested under closely controlled tions, using a simple block pattern. Mould- ess and density surveys were carried out to mine the degree and uniformity of compaction. nple trace-plotting device has been developed etermining the frequency and length of the troke, and the effect of such variables as table air-line pressure on the jolt stroke, and fre- y determined. The results obtained emphasize nportance of keeping within the rated capacity e machine and maintaining a high air-line re, if deleterious effects on the compaction of oulds are to be avoided. Rather low mould- ess figures were obtained by squeeze alone, ugh some improvement resulted from the use ofile squeeze heads. Best results were obtained jolt plus squeeze, but the air-line pressure still marked effect on the efficiency of operation machine, and upon mould compaction.

Other Essentials

e influence on compaction of such variations moulding mix as: moisture content, green- th, and aeration, was investigated. It was that the degree of compaction is fairly in- dent of the properties of a given moulding but that the use of a high-green-strength, lumpy sand can cause very serious defects in the mould. The effects of very high squeeze pressures have also been studied, a much greater degree of hardness being obtained with high-green-strength flowable mixes than with the more orthodox mix. (Practical methods of applying high squeeze pressures are now described in the original paper, and the advantages and disadvantages of diaphragm moulding, as evidenced by published information and observations made by the Association, discussed.) Regular and systematic inspection and maintenance of moulding machines is essential. Often, insufficient attention is paid to ensuring an adequate supply of air, at a sufficiently high air-line pressure, to the machine. In certain foundries, cut-off valves are fitted in the air-line to each machine so that no mould can be made when a machine is operating at less-than-optimum air-supply conditions.

Application of Sandslingers in Steel Foundries

By M. C. Lloyd, M.B.E., and W. L. Beasley (F. H. Lloyd and Company, Limited.)

The main advantages of sand-slinging are: uniformity of ramming density throughout the mould, with virtually no loss of hardness at vertical pattern faces; substantial savings in time and labour as compared with hand-ramming methods, and the fact that the Sandslinger can be applied to either jobbing or repetition work with equal success. The F. H. Lloyd organization operate a total of nine 'slingers in their three foundries. These include four American Speedslingers, two German Speedslingers, and three British Sandslingers. " Speedslingers " are machines where the operator guides the machine whilst sitting on the slinger head, while " Sandslingers " are those manually controlled by the operator standing on the floor. " Speedslingers " are capable of ramming roughly twice the volume of sand per min. over nearly twice the radius of coverage, as compared with the " Sandslinger " capacity.

(Comparisons are made between the American and German machines and an early British mobile Sandslinger, which is now obsolete, as regards ramming capacity, area covered, impeller drive, head size, peripheral speed, cost, etc.). The first American Speedslinger was installed in the author's foundry in 1951, and the high opinions held of this machine were fully justified. In fact, production times were considerably reduced, and the moulders were able to increase their average incentive earnings.

Extensive Foundry Alterations

The introduction of the Speedslinger opened the door to quite extensive and radical alteration of foundry methods on certain standard repetition lines. Split patterns mounted on accurately-jigged patternplates were introduced, and mounted patterns are now used for a wide range of quantity jobs, of which the biggest is a 7-ton casting in a 19- by 8-ft. box. A second machine has been installed in this foundry, and two further machines

Steelfoundry Practice

in other foundries within the organization—all these Speedslingers have performed with consistent reliability and success, and are easy to maintain. Due to the substantial increase in mould production, core production became the foundry's bottle-neck. This was overcome by the introduction of a layout employing three stationary Sandslingers as the ramming machinery. The saving of ramming time solely as a result of the Sandslinger amounts to 44 per cent., while the total saving—in ramming, stripping, and finishing—is 31 per cent. Recently, a section of the foundry which was originally occupied on the production of repetition moulds on jolt/rollover machines has been converted to a rollover machine incorporating Speedslinging. This machine employs two German slingers, the moulds traversing a circuit made up of several stations, each of which constitutes a definite part of the production cycle. The operation of the plant has been subjected to intensive work study in order to eliminate all operational bottle-necks and delays, and to provide a sound basis for the installation of comprehensive incentive schemes to increase production and lower costs.

Introduction to Patternmaking in Plastics

By H. G. C. King (British Railways, Crewe)

This paper is based largely on accounts which the author has presented to meetings of the IBF and the National Society of Master Patternmakers.[*]

The author describes the production of patterns in plastics as carried out in the patternshop which serves the foundries of the Crewe locomotive works, and states that such patterns, in use on jolt/squeeze machines, have produced many thousands of high-quality moulds without needing repair. The types of materials (resins, fillers, hardening and release agents, etc.) required for the manufacture of the patterns are described, as is also the necessary equipment for mixing, casting and drying. A detailed description is given of each stage of manufacture of a plaster pattern, starting with the preparation of the master pattern and production of plaster moulds. The patterns may then be made by either solid-casting, shell-casting with a preformed core, or with fibreglass laminates. Full details are given of each process, including the mixes to be used, and the method of application. Pattern repairs are said to be comparatively simple, using a putty for rebuilding broken parts or a cream for repairing shallow surface damage. In conclusion, the author stresses the immense possibilities of plastics for patternmaking. Whilst they are more expensive than wooden patterns, he states, they offer many advantages, one of which is superior finish, which gives improved flow of sand over the plastic surface and allows easier stripping from the mould. Furthermore, he concludes, exposure to varying atmospheric conditions during use and storage, and the use of warm and damp sand base, have no effect on the patterns.

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[*] For example "Plastic Patterns," a meeting reported in the JOURNAL, October 8, 1959.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

810,555 Thomas Reynolds, Little Harrowden, near Wellingborough, Hants.

Improvements relating to apparatus for clamping together parts to be joined—such as in the closing and welding together of shell moulds. This invention has for its objective an apparatus which will apply constant pressure over the whole of the mould surface, give a quick, simple, and ready means of closing the mould, and give an equal pressure at predetermined positions over the mould surface.

810,653 Continuous Casting Company, Limited, 17, Victoria Street, London, S.W.1.

This Patent relates to containers for mould metal, *e.g.*, ladles and tun dishes, used for casting. It is particularly, but not exclusively, applicable to the use of such containers in continuous-casting processes.

810,988 Harborough Construction Company, Limited, Harbilt Works, Market Harborough, Leics.

Sand mixtures consisting essentially of silica sand and drying oils for foundry moulds and cores. This company claims the inclusion of an accelerating agent. This consists of or comprises potassium permanganate, which is included to hasten the rate of hardening of the mixture when moulded. It may also consist of a dry powdered mixture of potassium permanganate with a clay or equivalent diluent.

811,197. Karl Schmidt, G.m.b.H., 10, Fabrikstrasse, Neckarsulm, Wurttemberg, Germany.

Ingots or similar shaped objects adapted to be stacked and conveyed by means of lifting and handling equipment—such as fork-lift trucks—without requiring to be secured by special means such as bands and supports to prevent the stack from collapsing. Essentially, the present invention claims the use of pyramidal-shaped teeth along the shorter edges of the castings—an odd number on one edge and an even number on the other. Generally one tooth on one side and two on the other are sufficient. (See also B.P. 754,177.)

811,476. H. F. Ebenhard Backstrom, Kauppakatu, 9 C 26, Tammerfors, Finland.

Apparatus for the manipulation of moulding patterns and boxes during moulding operations, which is supported by a crane. It is one of the principal objects of this invention to provide an improved apparatus which will be able to cope with different-size moulding boxes.

811,630. Harborough Construction Company, Limited, Harbilt Works, Market Harborough, Leics.

Production of a moulding mixture of sand and drying oil for foundry mould- and core-making. An accelerating agent is included which consists of suitable metallic napthenates, linoleates and/or rosinates (such as white spirit) in order to hasten the rate of hardening of the mixture when moulded.

811,805. Juenkerather Gewerkschaft, Juenkerath, Rheinland, Germany.

A method of moulding and hardening cores in which the hardening medium is passed into the sand through a perforated bladder. Carbon dioxide, compressed air, core-hardening oil and hot air, are all claimed as pressure media.

Future of Ironfounding

Abstract from the IBF Edward Williams Lecture given by Sir Frederick Scopes*

It is appropriate at the end of the year to consider the state of the industry and its prospects for the future. In this connection—as far as ironfounding is concerned—the 1959 Edward Williams lecture is extremely pertinent. What follows is an abstract from Sir Frederick Scopes' remarks when he gave the lecture and some of the statistics he reported. Since the date these were quoted, the industry has been much encouraged by a considerable upsurge in business in nearly all areas, and events thus seem to be moving towards substantiation of the lecturer's prediction of a brighter future for ironfounding.

In his Edward Williams Lecture, Sir Frederick Scopes, who had taken for his subject "thoughts on the future of the ironfounding industry," based most of his remarks on a number of tables of statistics which had been handed round to the members assembled (some of which are reproduced in Fig. 1 and Tables 1 to 6, the statistics reported being largely self-explanatory†).

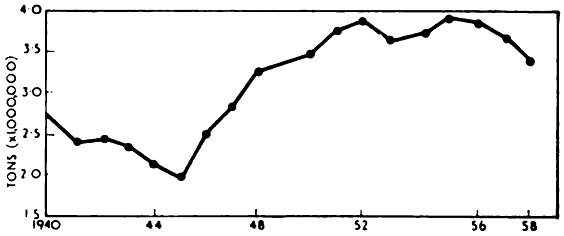

FIG. 1.—*Graph showing the total output of iron castings in the UK from* 1940 *to* 1958.

Bright Future for Ironfounding

TABLE 1.—*UK Ironfounding Establishments classified according to Numbers Employed.*

Persons employed	Number of establishments			Number of establishments as a percentage of total number of establishments.		
	June, 1957.	June. 1958.	End of 1958.	June. 1957.	June, 1958.	End of 1958.
0– 10	321	342	308	19	20	19
11– 25	377	377	386	22	23	24
26– 50	370	352	330	22	21	21
51– 75	196	188	183	12	13	12
76–100	103	86	91	6	5	6
101–300	241	225	218	14	13	14
Over 300	82	78	67	5	5	4
Total	1,690	1,648	1,583	100	100	100

From the above it can be seen that approximately two out of five firms employ under 25 persons; two out of three employ under 50; and three out of four employ under 75. Only one firm in five employs over 100 workers. One-fifth of the firms produce three-quarters of the output.

TABLE 2.—*Percent Change in Total Production of Iron Castings from* 1949 *to* 1958.

Castings in grey and malleable iron.	1949.	1958.	Change.
	Tons (× 1,000).	Tons (× 1,000).	(Per cent.).
Automobile (tractors, cars, commercial vehicles and motor cycles)	334.8	561.6	+68
Coal, iron and steel ..	485.4	536.6	+11
Pressure pipes	545.3	499.8	− 8
Building industry ..	321.6	397.2	+24
Heavy engineering ..	396.4	320.8	−19
General engineering ..	570.3	526.4	− 8
Railway equipment ..	321.8	345.3	+ 7
Domestic goods ..	152.9	111.3	−27
Unclassified	259.6	169.6	−35
Totals	3,388.1	3,468.6	+ 2
Of which castings in malleable iron only ..	120.4	160.9	+34

Initially, Sir Frederick mentioned that originally he had been invited to give the lecture two years ago, but circumstances had intervened and it was now pleasing to record that the future for the ironfounding industry was much brighter than when he was first approached. Only by considering the years since the 1914/18 war, he said, was it possible to gain a conception of the foundry business as an industry; prior to that it had been an agglomeration of independent competing units. He confirmed his view that the ironfoundry industry had inescapable links with the iron and steel industry as a whole. It was dependent on the same basic raw materials as the steel industry and this, of course, was one of the main reasons for the inclusion of ironfounding within the general supervision of the Iron and Steel Board. However, there had been important limitations to the power of the Board in respect of ironfounding. Next, Sir Frederick dealt with relations with other industries, saying that 27 per cent. of ironfounders were "tied" to the engineering industry, producing castings solely for

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* Sir Frederick, who is chairman of Stanton Ironworks Company, Limited, was lecturing at the annual conference of the Institute of British Foundrymen, in Scarborough.

† Since these figures were made public, last June, a number of interesting trends have been revealed by changing events. The JOURNAL is indebted to Mr. P. Moore of the Council of Ironfoundry Associations for bringing the statistics tabulated up to date at the time of going to press, so that the effect of recent events can be gauged—Editor.

TABLE 3. *A: Comparative Rates of Iron and Steel Production; B: Iron Castings Production per Head of Population, and C: Indices based on 1949, in the US, UK and West Germany.*

A:	Production (English long tons × 1,000).								Ratio of iron-castings production to crude-steel production.				B: Population (millions).				Production of iron castings per head of population (English long tons).			
Year.	USA		UK		West Germany.				USA	UK	West Germany.		USA	UK	West Germany.		USA	UK	West Germany.	
					Excluding Saar.		Including Saar.				Excl. Saar.	Incl. Saar.			Excl. Saar.	Incl. Saar.			Excl. Saar.	Incl. Saar.
	Iron Castings.	Crude Steel.	Iron Castings.	Crude Steel.	Iron Castings.	Crude Steel.	Iron Castings.	Crude Steel.												
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*	*p*	*q*	*r*	*s*	*t*
1949	10,060	69,620	3,390	15,550	1,520	9,010	1,616	10,740	0.144	0.218	0.169	0.150	149.1	50.4	48.3	49.2	0.0675	0.0673	0.0315	0.0328
1950	12,340	86,460	3,490	16,290	1,950	11,930	2,067	13,798	0.143	0.214	0.163	0.150	151.7	50.3	49.1	50.0	0.0813	0.0694	0.0397	0.0413
1951	14,350	93,930	3,750	15,640	2,490	13,290	2,647	15,855	0.153	0.240	0.187	0.167	154.4	50.3	49.5	50.5	0.0929	0.0746	0.0503	0.0524
1952	12,320	83,190	3,830	16,420	2,610	15,560	2,768	18,334	0.148	0.233	0.168	0.151	157.0	50.4	49.8	50.8	0.0785	0.0760	0.0524	0.0545
1953	13,110	99,650	3,640	17,610	2,300	15,180	2,456	17,818	0.132	0.207	0.152	0.138	159.6	50.6	50.4	51.4	0.0821	0.0719	0.0456	0.0478
1954	11,020	78,850	3,740	18,520	2,710	17,160	2,896	19,920	0.140	0.202	0.158	0.145	162.4	50.8	50.9	51.9	0.0679	0.0736	0.0532	0.0558
1955	14,230	104,500	3,930	19,790	3,270	21,000	3,493	24,114	0.136	0.199	0.156	0.145	165.3	51.0	51.4	52.4	0.0861	0.0771	0.0636	0.0667
1956	13,230	102,870	3,900	20,660	3,320	22,820	3,548*	26,144	0.129	0.189	0.145	0.136	168.2	51.2	52.0	53.0	0.0787	0.0762	0.0638	0.0669
1957	12,080	100,640	3,720	21,700	3,180	24,120	3,399*	27,505	0.120	0.171	0.132	0.124	171.2	51.4	52.7	53.7	0.0706	0.0724	0.0603	0.0633
1958	9,848	76,120	3,470	19,570	2,970	22,430	--	--	0.129	0.177	0.132	--	174.8	51.7	53.3	—	0.0563	0.0671	0.0557	—
C: *Indices*, 1949 = 100.																				
1949	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1950	122.7	124.2	103.0	104.8	128.3	132.4	127.9	128.5	99.3	98.2	96.5	100.0	101.7	99.8	101.7	101.6	120.4	103.1	126.0	125.9
1951	142.6	134.9	110.6	100.6	163.8	147.5	163.8	147.6	106.2	110.1	110.7	111.3	103.6	99.8	102.5	102.6	137.6	110.8	159.7	159.8
1952	122.5	119.5	113.0	105.6	171.7	172.7	171.3	170.7	102.8	106.9	99.4	100.7	105.3	100.0	103.1	103.3	116.3	112.9	166.3	166.2
1953	130.3	143.1	107.4	113.2	151.3	168.5	151.9	165.9	91.7	95.0	89.9	92.0	107.0	100.4	104.3	104.5	121.6	106.8	144.8	145.7
1954	109.5	113.3	110.3	119.1	178.3	190.5	179.2	185.5	97.2	92.7	93.5	96.7	108.9	100.8	105.4	105.5	100.6	109.4	168.9	170.1
1955	141.5	150.1	115.9	127.3	215.1	233.1	216.2	224.5	94.4	91.3	92.3	96.7	110.9	101.2	106.4	106.5	127.6	114.6	201.9	203.4
1956	131.5	147.8	115.0	132.9	218.4	253.3	219.6	243.4	89.6	86.7	85.8	90.7	112.8	101.6	107.7	107.7	116.6	113.2	202.5	204.0
1957	120.1	144.6	109.7	139.6	209.2	267.7	210.3	256.1	83.3	78.4	78.1	82.7	114.8	102.0	109.1	109.1	104.6	107.6	191.4	193.0
1958	97.9	109.3	102.4	125.9	195.4	248.9	—	—	89.6	81.2	78.1	—	117.2	102.6	110.4	—	83.4	99.7	176.8	—

* Estimated.

use by parent companies; about 59 per cent. were "free" and the remaining 14 per cent. sold some castings in the open market and some for parent companies. Out of 1,648 ironfoundry firms in the UK, 1,071 employed 50 people or fewer (see Table 1). Despite what appeared from this table, the very smallest foundries were in fact being reduced in number, the lecturer added.*

"Let's Buy Outside" Attitude

Continuing, Sir Frederick mentioned the value of "good-housekeeping" in increasing the productivity of founders and gave instances of where American figures for the total number of ironfoundries showed parallel with those of this country. Early in the century there had been 4,000 ironfoundries in the US, 3,000 in 1941, and only 2,000 in 1959. Here he quoted from *Gray Iron News*,† the Journal of the American Gray Iron Founders Society, describing the modern foundry set-up in the States, which showed an increase in the "let's buy outside" attitude by owners of tied foundries. Then Sir Frederick explained his various tabulated statistics, saying that Table 2, for example, showed the change in the type of production from 949 to 1958, but pointing out the difficulty of drawing any serious inferences from it, because of factors not revealed.

Competition from Alternative Materials

Brief reference was made to the competition which ironfounders were experiencing from alternative materials, such as reinforced concrete, plastics, man-made fibres, weldments, etc., and it was not to be expected, said Sir Frederick, that the foundry industry would retain all the end-uses listed in his statistics. Fortunately, however, new uses had arisen faster than old ones had declined (except for the recession years 1957 onwards). Here the lecturer drew attention to Table 5, which showed an interesting analysis of the relation between industrial production and castings output, carried out by Mr. Lars Villner (of Sweden). His paper on the subject had been fully discussed with Mr. Moore of the UK Joint Iron Council before being presented by Mr. Villner at the Foundry Congress at Liège (see FOUNDRY TRADE

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* Numbers of iron foundries officially registered as operating in the United Kingdom have shown the following net changes in the last few years: 1955, minus 21; 1956, minus 69; 1957, minus 33; 1958, minus 90, and 1959, minus about 55. Bearing in mind that just a few new foundries have been opened in the period, it would seem clear that over 270 have closed. Not all of these are small foundries, however. Although there is little doubt that, taking the country as a whole, total *capacity* for iron castings production has expanded during the period, this increment mainly concerns the repetition type of castings. It does not by any means follow that the same productive capacity still exists for specialized types of sizeable castings—Editor.

† See also Leading Article in this issue, page 665.

	USA							United Kingdom								West Germany							
	Grey-iron castings.							Grey-iron castings.								Grey-iron castings.						
	Heavy steel ingot-moulds.	Pressure pipes and fittings.	Soil pipes and fittings.	Other castings.	Total grey-iron castings.	Malleable-iron castings.	Total grey- and mall.-iron castings.	Ingot moulds.	Pressure pipes and fittings.	Pipes and gutters other than pressure pipes.	Other castings.	Total grey-iron castings.	Malleable-iron castings.	Total grey- and mall.-iron castings.	Ingot moulds.	Pressure pipes and fittings.	Pipes and fittings other than pressure pipes.	Other castings.	Total grey-iron castings.	Malleable-iron castings.	Total grey- and mall.-iron castings.
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*	*p*	*q*	*r*	*s*	*t*	*u*
Proportion of total in 1949 (per cent)	15.7	9.1	5.0	63.9	93.7	6.3	100	9.4	15.6	2.8	68.6	96.4	3.6	100	11.2*	17.0*		67.0*	95.2*	4.8*	100*
1949	1585.9	919.4	502.9	6410.8	9419.0	636.9	10055.9	318.3	528.3	96.7	2324.4	3267.7	120.4	3388.1	—			—	—	—	1521.0
1950	2061.3	1074.8	679.7	7707.1	11522.9	821.9	12344.8	321.7	555.3	103.5	2376.9	3357.4	129.5	3486.9	217.5	332.7		1305.0	1855.2	93.5	1948.7
1951	2334.4	1315.4	613.8	9119.1	13382.7	968.9	14351.6	334.3	571.9	108.3	2595.4	3609.9	142.6	3752.5	—			—	2365.0	126.0	2491.0
1952	1998.5	1171.9	581.7	7738.5	11490.6	826.9	12317.5	322.7	611.0	114.8	2633.1	3681.6	149.1	3830.7	—			—	2472.3	133.9	2606.2
1953	2526.1	1147.9	604.6	7960.6	12239.2	866.5	13105.7	374.5	669.3	128.5	2331.9	3504.2	134.3	3638.5	—			—	2201.7	102.4	2304.1
1954	1593.4	1229.2	664.0	6810.0	10296.6	725.0	11021.6	352.1	694.6	129.0	2425.0	3600.7	141.8	3742.5	—			—	2577.6	130.9	2708.5
1955	2446.3	1501.4	776.4	8523.8	13247.9	986.4	14234.3	378.3	685.1	146.4	2550.9	3760.7	164.4	3925.1	390.7	497.0		2221.4	3109.1	162.4	3271.5
1956	2342.9	1559.7	730.2	7742.6	12375.4	849.9	13225.3	429.6	665.6	139.9	2505.0	3740.1	159.1	3899.2	460.6	433.1		2249.9	3143.6	174.2	3317.8
1957	2151.2	1206.5	677.1	7272.8	11307 6	770.5	12078.1	434.4	512.1	140.1	2469.2	3555.8	159.3	3715.1	483.2	385.8		2139.7	3008.7	170.3	3179.0
1958	1682.5	1140.8	704.2	5732.5	9260.0	589.9	9849.9	360.8	482.6	128.1	2336.2	3307.7	160.9	3468.6	391.7	245.1	132.9	2025.4	2795.1	175.2	2970.3
Proportion of total in 1956	17.7	11.8	5.5	58.5	93.5	6.5	100	11.0	17.0	3.6	64.3	95.9	4.1	100	13.9	13.0		67.8	94.7	5.3	100
1958	17.1	11.6	7.1	58.2	94.0	6.0	100	10.4	13.9	3.7	67.4	95.4	4.6	100	13.2	8.2	4.5	68.2	94.1	5.9	100
	Indices, 1949 = 100†																				
1949	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	—			—	—	—	—
1950	130.0	116.9	135.2	120.2	122.3	129.0	122.8	101.1	105.1	107.0	102.3	102.7	107.6	102.9	100.0	100.0		100.0	100.0	100.0	100.0
1951	147.2	143.1	122.1	142.2	142.1	152.1	142.7	105.0	108.3	112.0	111.7	110.5	118.4	110.8	—			—	127.5	134.8	127.8
1952	126.0	127.5	115.7	120.7	122.0	129.8	122.5	101.4	115.7	118.7	113.3	112.7	123.8	113.1	—			—	133.3	143.2	133.7
1953	159.3	124.9	120.2	124.2	129.9	136.0	130.3	117.7	126.7	132.9	100.3	107.2	111.5	107.4	—			—	118.7	109.5	118.2
1954	100.5	133.7	132.0	106.2	109.3	113.8	100.6	110.6	131.5	133.4	104.3	110.2	117.8	110.5	—			—	138.9	140.0	139.0
1955	154.3	163.3	154.4	133.0	140.7	154.9	141.6	118.9	129.7	151.4	109.7	115.1	136.5	115.8	179.6	149.4		170.2	167.6	173.7	167.9
1956	147.7	169.6	145.2	120.8	131.4	133.4	131.5	135.0	126.0	144.7	107.8	114.5	132.1	115.1	211.8	130.2		172.4	169.4	186.3	170.3
1957	135.6	131.2	134.6	113.4	120.1	121.0	120.1	136.5	96.9	144.9	106.2	108.8	132.3	109.7	222.2	116.0		164.0	162.2	182.1	163.1
1958	106.1	124.1	140.0	89.4	98.3	92.6	98.0	113.4	91.3	132.5	100.5	101.2	133.6	102.4	180.1	113.6		155.2	150.7	187.4	152.4

* 1950. † West Germany, 1950 = 100.

JOURNAL, January 1 and January 8, 1959). Mr. Moore had been strongly in favour of using the years 1949 to 1957 as the basis for the trend, but Mr. Villner had preferred to take 1946 to 1957. Both Mr. Moore's and Mr. Villner's basic findings were summarized and shown in the Table in question.

More Economies Necessary

Up to 1914, Sir Frederick went on to say, United Kingdom industrial development had been based on coal and iron—in effect, cheap coal. Changes since then had been reflected in huge increases in the price of coal, and iron had borne a proportionately high increase and was thus at a disadvantage compared with concrete or asbestos cement, for example. Such disparity was also reflected in the gap between scrap and pig-iron prices. Two general inferences could be drawn: (1) that more economies were necessary in coal consumption, and (2) that foundry technical experts must work for further economies in production methods. The qualities of cast-iron were still not fully exploited, and still less fully understood by people outside the industry. There must be more customer/founder liaison, with the realization that any complaint about a single casting was in effect a complaint against the whole industry, Sir Frederick added. Yet another approach to considering future prospects was to take the statistics and view their extrapolation *vis-à-vis* those of the United States of America and West Germany. Here, Sir Frederick referred to Tables 3 and 4, saying

TABLE 5.—*Iron Castings Production in Relation to Industrial Production (and Extrapolations based on Mr. Villner's and Mr. Moore's concepts).*

Notes: (1) Mr. Villner selects an exponential curve of the form $Y = a.X^b$ (where Y = the index of cast-iron production, X = the index of industrial production and a and b are constants). Almost the same results, however, are obtained from an equation of the first degree of the form $Y = a + bX$, which is the formula adopted by Mr. Moore.* The analysis of the relation can therefore be carried through both for the period 1949-57 (the period chosen by Mr. Moore) and for the period 1946-57 (the period chosen by Mr. Villner) on the basis of Mr. Moore's formula without materially altering Mr. Villner's conclusions. The differences between the results obtained by using the period 1946-57 and 1949-57 are considerable, *e.g.*, (3) 1946-1957 $Y = 26.051 + 0.731X$ and for 1949-57 $Y = 66.674 + 0.344X$. This can be simply illustrated by reference to the Table, where a cumulative rate of increase in industrial production of 3½ per cent. p.a. is assumed to take place over the years 1959-2000 (although the figure for this year is not to be taken too seriously!)

(2) The Table projecting the trend demonstrates that to have much forward economic logic an exponential curve of asymptotic form would probably give the most significant results, *i.e.*, $Y = K + sb^x$ where K is the asymptote.

(3) $Yc = a + bX$ (data as shown in Table); $a = Y - bX$ and $b = \xi\, xy \,/\, \xi\, x^2$ (see below).

(4) The series has been amended to allow the usage of more-reliable indices of industrial production (the London and Cambridge Economic Service series being used), to obtain a greater accuracy of working and to take into account later information. This leads to only small change in the earlier years, but to noticeable differences for later years.

Year.	Index on industrial production, 1953 = 100.	Castings production. Index 1953 = 100.	Castings production. Tons (× 1,000)
1946 ..	72.1	69.7	2,537
1947 ..	76.5	78.2	2,846
1948 ..	83.1	90.3	3,284
1949 ..	88.2	93.1	3,388
1950 ..	94.1	95.9	3,487
1951 ..	97.1	103.1	3,752
1952 ..	94.1	105.3	3,831
1953 ..	100.0	100.0	3,638
1954 ..	107.4	102.9	3,742
1955 ..	113.2	107.9	3,925
1956 ..	112.5	107.2	3,899
1957 ..	115.4	102.1	3,715
1958 ..	114.0	93.6	3,403
1959 (est.)	119.0	96.2	3,500

Year.	Projection on basis of 3½ per cent. p.a. increase.	Projection of trends on the basis of continued average relation between industrial production and castings production. (Mr. Villner's basis, 1946 to 1957.)	(Mr. Moore's basis, 1949 to 1957.)	(Mr. Villner's basis, 1946 to 1957.)	(Mr. Moore's basis, 1949 to 1957.)
1960 ..	123.2	116.1	109.1	4,224	3,969
1962 ..	131.9	122.5	112.0	4,457	4,075
1965 ..	146.3	133.0	117.0	4,839	4,256
1975 ..	206.3	176.9	137.6	6,436	5,006
2000 ..	487.6	382.5	234.4	13,915	8,527

TABLE 6.—*Indices of Industrial Production and Iron-castings Usage*, 1949 *to* 1958.

—	All industries.		All manufacturing industries.		Engineering, shipbuilding and electrical goods.		Vehicles.		Building and contracting.	
	Industries.	Castings.	Industries.	Castings.	Industries.	Castings.	Industries.	Castings.	Industries.	Castings.
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1949	100	100	100	100	100	100	100	100	100	100
1950	108	103	108	102	109	98	109	121	100	107
1951	110	110	113	112	120	110	112	131	96	108
1952	108	110	108	113	120	111	112	126	99	111
1953	114	107	115	102	122	90	124	114	106	119
1954	123	110	124	105	132	92	140	137	110	121
1955	129	115	133	111	146	100	155	161	110	129
1956	128	114	131	110	143	104	144	138	117	134
1957	130	109	133	109	146	97	149	155	117	137
1958	128	101	132	105	—	87	160	165	116	123
Average annual increase, 1949-1955 inclusive (per cent.)	+4½	+2½	+5	+2	+6½	0	+7½	+8½	+1½	−4½
Average annual increase, 1955-1957 inclusive (per cent.)	+½	−2½	0	−1	0	−1½	−2	−2	+3½	−3
Percentage of total iron-castings output in 1957 accounted for by this group	—	100	—	57	—	25	—	14	—	12
Percentage of total iron-castings output in 1958 accounted for by this group	—	100	—	59	—	24	—	16	—	11

that the US might be a mirror, though there was a danger of its being a distorting one due to " off-the-beam " changes. It was then possible, he said, to transfer this forward thinking to the changes within the various consuming groups in the industry (see Table 6).

Conclusion

In conclusion, Sir Frederick said that he hoped that the commercial consideration which he had outlined would not be out of place amongst the technical people gathered at the conference. Perhaps the figures presented would enable those present to get a broader picture of the industry as it stood to-day, and of its future.

A FIRE which occurred at the iron foundry of J. H. Heaton, Limited, Market Street, Keighley, caused damage to the ground-floor core- and fettling-shops. Arrangements have been made to carry on business as usual.

gerous Machinery: Contributory Negligence ı Employee who was operating a Mill

By "Barrister-at-Law"

ıer important decision, with regard to the contributory negligence on the part of a n operating dangerous machinery, has been the recent case of Rushton *versus* Turner Asbestos, Limited. Under S.14(I) of the s Act 1937, every dangerous part of any ry is required to be securely fenced, unless such a position or of such construction as safe to every person employed as it would urely fenced. In the above case, the plain- ıght an action against his employers claim- ıages in respect of an injury which he had d, when in their employment, while ıg a machine. The basis of the claim was employers had been guilty of a breach of ve provision of the Factories Act, in failing the dangerous parts of a machine which he ıuired to operate to be securely fenced.

The Material Facts

material facts of this case were as follow. ıchine in question was for all practical pur- he same as a foundry sand mill, and con- of a rotating pan within which were two stones connected by a central pin. The of the mill was to crush the material with t was fed. From time to time, the material, as crushed, tended to stick in the grooves which a trap door slid at the base of the e. Through this trap door the material into a chute. The mill could be cleaned bove by lifting the cover off the pan, for this the machine being stopped (whereupon the automatically ceased to rotate). There was an tive method of cleaning, however, which was usually adopted. When using this method, pdoor at the bottom was opened and the cleaned by hand from below, the hand ushed through the trap door into the inside machine, where the grooves were. This l likewise necessitated the stopping of the n of the stones. The defendants were aware is alternative method was usually adopted ir workmen, whose practice it was to stop chine before attempting to clean the machine way. There was, however, *no guard or on this part of the mill.* (Pausing there for ıent, it would appear that this part of the ıe at any rate was of a dangerous character, ıat accordingly a statutory obligation was d on the employers to fence it securely.)

ıan's Previous Training

workman who was suing in this case had ısly received adequate training in using and ıg the machine, and he had been warned to attempt to clean it without first stopping oreover, a card had been handed to him set out various safety measures which were to be adopted, and which likewise contained a warning against touching any parts of the mill while it was in motion, excepting those parts which it was part of his job to touch while operating it. He had been given proper instructions by the foreman and by an instructor in the operating procedure.

The Accident

At the date of the accident, the workman had been operating the mill for about six months. On the occasion in question, it was found that a small piece of metal had broken away from the top edge of one of the grooves, the effect of which had been to separate the groove from the pan with the rotating stones. However, the mill was considered to be still safe to use, though in that condition, and it was decided to continue using it for the remainder of the shift, the workman being fully aware of its condition. Later in the afternoon, when it became necessary to clean the groove, the workman put his left hand into the machine for the purpose, while the machine was still in motion, and got his fingers crushed. On these facts the court had to determine whether there was any liability on the part of the employers.

Were the Employers in Breach?

The employers had thought that no sensible workman would attempt to clean the machine while it was in motion. However, the Factories Act, it should be pointed out, is designed *inter alia,* for the benefit of workmen who do not act as sensibly as they ought. The employers were aware that their workmen were in the habit of cleaning the machine in the manner described above. That being so, they ought to have contemplated the possibilities that some day, someone would attempt to clean the machine in this way *while the machine was in motion.* The employers, therefore, were regarded by the Court as being in breach of their statutory obligations in failing to fence the machine securely.

Effect of Contributory Negligence of Workman

On the other hand, however, the workman had been guilty of contributory negligence. His foolish conduct had contributed to the accident. The question arose as to whether this contributory negligence was the cause of the accident, to the extent of 100 per cent. responsibility, or to some lesser extent. If it was 100 per cent. responsibility, then it would have been the *sole effective cause* of the accident, and the employers could not be held responsible, not withstanding their default in fencing as required by the Factories Act. The Court held that, on the facts of this case, the workman was 100 per cent. to blame, and that therefore the employers were not liable.

Dangerous Machinery: Contributory Negligence

Basis of the Decision

It was pointed out by the Court that the workman had not been injured by reason of some *accidental omission* to take care; nor had it been a case of *momentary* inadvertence, or *failure to remember* the safety rules with regard to the operation of the machine. On the contrary, *the workman had known full well that the machine was in motion*, and moreover, that the limited protection given by the top of the groove had been greatly reduced by the breakage; further, he must have known of the great risk he was running in *deliberately* inserting his hand into the moving groove. The workman, in fact, admitted in evidence that it was a "crazy" thing to do, and that he was not likely to repeat it. As his act had been *quite deliberate*, it had been, in the opinion of the Court, the *operative and effective* cause of the accident. This is a decision which all employers and employees should carefully note.

Metallurgical Abstract

Effect of Specimen Taper on Determination of Elongation in the Tension Test. E. B. KULA and F. R. LARSON. ("ASTM Bulletin," 1959; No. 238; pp. 58-61). In the ASTM standards for round tension specimens, a 1 per cent. difference in diameter is permitted between the centre and ends of the gauge-length section. This difference in original diameter at these two points is found to lead to difference in local strain of over 30 per cent. Two models for the shape of a tension specimen are assumed, and the effect of the difference in strain between the centre and the end of the gauge-length section on total elongation is calculated.

Standard ASTM specimens of titanium, iron, and copper were prepared. Calculated results for materials with strain-hardening exponents of 0.17, 0.22, and 0.38, typical of titanium, iron, and copper are shown. In the case of steel, a conical bar has elongated only 19.8 per cent., whereas a uniform bar would have elongated 24.6 per cent. An effort was made to check these calculations experimentally. With mild-steel bars, the strain at maximum load was only 0.16, lower than usual for this material.

At this strain, the elongation for the uniform bar was 16.6 per cent. and the standard ASTM bar, 13.9 per cent. Calculations give 17.4 per cent. for the uniform bar, 14.8 per cent. for the parabolic bar, and 13.6 per cent. for the conical bar. It is hoped that in the future more effort will be centred on the development of commercially-available, recording-diameter gauges.

FOUR LARGE CLOSED-CIRCUIT AIR COOLERS for the ventilation of the main motor room of the new strip mill now being built for Colvilles, Limited, at Ravenscraig, have been ordered from Heenan & Froude, *Limited*, Worcester, by Ozonair Engineering, Limited, *of Rochester*.

Book Reviews

Dimensional Control in Precision Manufacturing. By John L. Gadzala. Published by McGraw-Hill Publishing Company, Limited, 95, Farringdon Street, London, E.C.4; price 58s.

This admirably lucid and detailed exposition of the system devised by the author for constructing dimensional-tolerance charts is a useful addition to the literature on a frequently neglected branch of process planning. Mr. Gadzala has attempted to combine in his system the best features of a number of methods of constructing tolerance-charts, and it is therefore worthy of close study. His step-by-step explanations are coupled with clear diagrams and many illustrative examples of the practical application of the "method of traces" in the dimensioning of shafts, hubs, gears, housings, etc. Although the book inevitably reflects the author's background in the American aircraft and automobile industries, it will be of considerable assistance to engineers in other industries in clarifying and simplifying existing dimensional planning procedures.

Sound methods of calculating accumulations of dimensional tolerances in series of production machining operations in order to construct reliable tolerance-charts can contribute significantly to the improvement of process planning, and hence to the reduction of production costs, by helping to ensure that productive resources are being used most effectively. As the demands for greater precision increase in many fields of production, the opportunities for cost reduction through dimensional control will also increase, and thus it is essential that in future the problems involved should be more closely studied than they have often been in the past. Mr. Gadzala's book is a useful starting point for such a study of some of the most important practical aspects of the subject.

D. D. MORGAN.

Asbestos: Its Industrial Applications, by D. V. Rosato. Published by Chapman and Hall, 37, Essex Street, London, W.C.2; price 46s. net.

Although asbestos has probably been used for two millenniums it is still a material used extensively in industrial and other connections. In fact, with the improvement in existing asbestos products and the introduction of new ones, it has become obvious in recent years that asbestos is far from being a "played out" material. It is therefore appropriate to note the appearance of this book, not least because of the wide range of asbestos products which are described and assessed.

The author has assembled his material under ten chapter headings based on mode of utilization, the chief of which include asbestos-cement products, tiles, heat insulation, electrical insulation, friction materials, asbestos textiles, plastics, asbestos packings and gaskets and asbestos filters. The text is well illustrated and there is an adequate index and a useful bibliography. This book should prove of value to foundrymen and others concerned with metal melting and the production of castings, etc.

J. E. GARSIDE.

A CONTRACT, valued at over £40,000, for a fleet of Comet tipping trucks for road construction work has been placed with Leyland Motors, Limited, by the Public Works Department of Kuala Lumpur, Malaya. The Indian associate company, Ashok Leyland, Limited, has received an order for 40 bus chassis from the Indian State of Rajasthan, and a repeat order of 30 bus chassis from Ahmedabad Municipal Transport Service.

Equipment and Supplies

Nickel/Chromium Casting Alloy

Henry Wiggin & Company, Limited (Thames House, Millbank, London, S.W.1), report that Nimocast 713C nickel/chromium casting alloy is now available. This alloy is the equivalent of Inconel 713C, an investment-casting alloy for high-temperature service developed in the research laboratories of the International Nickel Company, and already specified for the turbine rotor blading of a number of US gas-turbine aeroengines. It is said to combine outstanding strength with excellent resistance to thermal fatigue at temperatures up to 980 deg. C. and is therefore of interest as a possible alternative to wrought alloys, which offer difficult production problems when developed for service at such elevated temperatures. In the US, where cast rotor-blades are considered acceptable for production engines and are in fact used in substantial numbers, this alloy is now well-established and has won a reputation for reliability under arduous service conditions. Nimocast 713C (the properties of which are set out in Table 1) is readily castable and is reported to develop its best properties when cast in vacuum. Alternatively, it can be cast under a protective atmosphere such as argon. A heat-treatment of two hours at 1,170 deg. C. followed by air-cooling is beneficial but not essential unless maximum mechanical properties are required.

TABLE 1. *Properties of Nimocast 713C (Nickel-Chromium) Alloy.*
Stress-to-Rupture Properties (tons per sq. in.).
Investment-cast in argon: "as-cast" condition (no heat-treatment).

Temperature, deg. C.	30-hr. life.	100-hr. life.	300-hr. life.	1,000-hr. life.
815	28.0	24.5	21.5	18.0
870	19.5	16.5	14.5	11.5
940	(12.5)	(10.5)	(8.5)	...
980	8.5	7.2		—

Investment-cast in vacuum: "as-cast" condition (no heat-treatment).

Temperature, deg. C.	30-hr. life.	100-hr. life.	300-hr. life.	1,000-hr. life.
870	22.8	19.0	16.5	14.5
940	14.0	12.0	10.0	8.5
980	10.5	8.7	7.5	6.8

(Figures in brackets are extrapolated values.)

Bench Shaper and Engraver

During the visit of members of the National Society of Master Patternmakers to Germany, considerable interest was aroused in a small bench router for pattern work, made by Friedrich Zimmermann of Denkendorf. One of the visitors, Mr. Harvey of J. J. Harvey & Pressurecast, Limited, Lime Bank Street, Manchester, 12, bought the one which is illustrated in Fig. 1. Mr. Harvey's firm is to have the agency as from January next and in the meantime is handling UK sales. The machine is actuated by a Bosch motor (220-v., 100-w.) running at 2,400 r.p.m. and has a table 23 by 16¼ in., the height of the spindle being adjustable to 17¼ in., and the pedestal rotatable through 360 deg. The machine will take tools up to 1⅜-in. dia. and weighs about 132 lb.; if engraving equipment be incorporated, another 55 lb. is added. With the attachment, the machine can be arranged to engrave from 1 to 1 up to 1 to 5. The equipment described forms part of a range of patternmaking machines, which includes a disc-sanding machine and a universal miller, made by the Zimmermann concern, all which will be handled in the UK by the Harvey company.

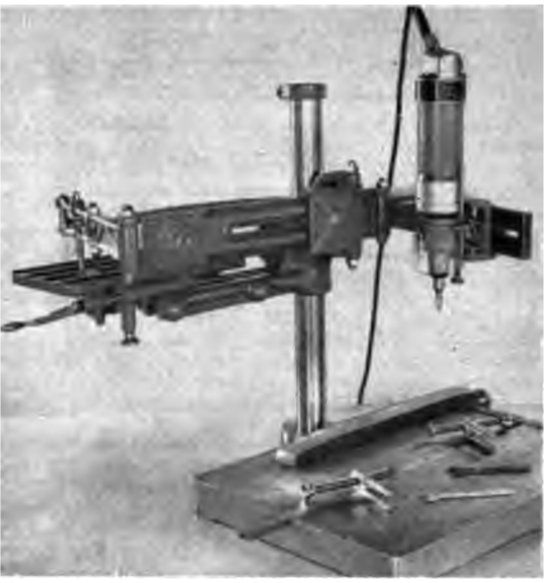

FIG. 1.—*Bench shaper and engraving machine installed in the works of J. J. Harvey & Pressurecast, Limited, of Manchester.*

Self-tapping Threaded Inserts

Tappex Thread Inserts, Limited—as the name indicates—produce a range of self-tapping threaded inserts. These are sold through Davis & Timmins, Limited, Billet Road, Walthamstow, London, E.17, and for them quite a number of foundry applications can be visualized. The new component is illustrated in Fig. 2, and one obvious foundry use is in the case of plastics and wood patterns, where screwed threads have a limited life. Cross threads, broken taps, and stripped threads in castings and other machined components can also be made good it is claimed, as this gadget, being made of case-hardened steel, will cut its own thread in a wide variety of materials. Where the devices are likely to be in constant use, a special fitting attachment is supplied for use with a machine-tool, but for casual use, an excellent instructional diagram shown on the distributor's catalogue No. GA 1047 (available to readers) outlines the procedure. Tool kits, consisting of a driver, tommy-bar and selection of thread inserts packed together are also available.

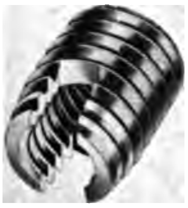

FIG. 2.—*"Tappex" self-tapping threaded insert for use in wood plastics, or metal, marketed by Davis & Timmins, of Walthamstow, E.17. A special fitting attachment is available for use with a machine-tool.*

FURANE PLASTICS have opened a new plant in Hempstead, Long Island, New York.

Welding of Cast Irons

Foundryman Lectures to South African Welders

At a recent problems evening of the South African Institution of Welding, Mr. D. Gordon Jones, senior vice-president of the Institute of British Foundrymen (South African branch) presented a short paper on the subject of "The Welding of Cast Irons." During the course of his address, Mr. Gordon Jones stated that welding as applied to cast irons was a process of salvage, reclamation or repair; welding was seldom used as a method of fabrication although some components in s.-g. iron were constructed in this way. Any use of welding in the foundry was governed by the nature of the defect and by economic considerations related to the cost of replacement casting or the time necessary to reproduce it. The weldability of cast-iron, he continued, depended mainly on composition which controlled the physical properties such as expansion, melting range and mechanical strength, but the behaviour during heating and cooling was also important. During founding, mould cooling rates could be controlled by attention to feeding and chilling, variation of thickness and moulding techniques. Although weld metal was a casting, a similar control over the cooling rate was difficult.

Welds should match the Parent Metal

In an ideal sense, the weld metal should match the parent metal and should not produce any significant effects in the heat-affected zone. The lack of ductility of grey iron plus the rigidity meant that it would not yield under heating and cooling stresses and these might be such as to crack the castings. Similarly the molten weld deposit would undergo contraction under conditions of restraint and crack. The method of building a mould around the crack or defect and pouring in molten metal producing a fusion weld was ancient practice and probably the origin of fusion welding. This method was still useful where a substantial quantity of metal must be added, but it did not call for skill. Occasionally Thermit welding was used in this way. The author then referred to the "Code of Practice for the Repair and Reclamation of Grey-iron Castings by Welding and Other Methods" based on a report of sub-committee T.S.23 of the Technical Council of the Institute of British Foundrymen. These documents, he said, set out recommended procedure which had proved successful and served to indicate what could be done if salvage repair and reclamation was properly undertaken.

Choice of Method

The method of welding, said Mr. Jones, depended on the size of the casting and type of defect, and often the choice was determined by the experience of the welder. Success in the use of oxyacetylene depended on judicious use of pre-heating and post-heating and was widely used for simpler castings. Metallic-arc welding had less thermal effect than oxyacetylene and was used to advantage on larger and more complicated castings. Bronze welding using filler material, based on 60/40 types of brass, could be used where pre-heating was difficult but was not to be recommended for castings operating above 250 deg. C. due to a decrease in joint strength. The problem of colour match could be overcome by whitening the alloy by additions of nickel up to 10 to 15 per cent.

Pre-heating

The author pointed out that it would be unwise to commence operations with a cold casting—it should be pre-heated at a degree varying from just warming to 650 deg. C. This should be done to prevent metallurgical changes which cause carbide formation or local hardening, and to reduce risk of cracking from temperature gradients produced in the casting or associated with weld metal contraction. Slow cooling and occasionally post-heating would be complementary to preheating.

Heating the whole of the casting was recommended and this taken in conjunction with gas welding was always likely to give good results, Mr. Jones said. Slow uniform heating was necessary and sometimes a temporary structure of brickwork was built around the casting and heated with gas or coke. Compromise was sometimes necessary when local heating only was possible, but great care was required specially in castings of complicated shape.

Metallic-arc Welding

Dealing with metallic-arc welding, the author said that a wide variety of rods were used, but the deposition of cast-iron as such was the exception. Mild-steel, austenitic stainless-steel, nickel and nickel alloys, tin and aluminium were all employed. Mild-steel would absorb carbon from castings, he said, to produce a steel composition with a high hardening characteristic—cooling had to be very slow, however, to avoid hardening. Nickel alloys also absorbed carbon, but it would be present as graphite and not carbides, so the weld would remain soft and machinable and the ductility of the weld would offset contractional stresses. It was claimed, he continued, that various electrodes would produce "soft welds," but while the deposit might be soft, if a true fusion had been made there was inevitably a heat-affected zone where cementite and perhaps martensite would exist, the significance of which would depend on service conditions. A buttering technique might be used whereby the sides of the weld were just coated with a nickel electrode, and the weld completed with a steel electrode so that the carbon was less easily absorbed by the steel. The author then said that it was advisable, where pre-heating was limited, to use small-dia. rods and short runs to avoid excessive heat build-up. When the deposited metal was flush with the parent metal, further runs might be laid to temper the heat-affected zones, he continued, but care must be taken not to overlap the parent metal again.

Other Methods

Another method used for remedying surface defects, he said, employed a bare nickel wire deposited at low current conditions. The rod was vibrated and in effect, the nickel "sputtered" on to the surface as a series of particles. The deposit so produced was porous, but did not heat the casting, and for the purpose for which it was intended provided a useful tool. Recently, a 5 per cent. Ni cast-iron rod has been developed for the gas-welding of s.-g. iron. Strong joints were possible with the use of nickel-iron electrodes, but there was still the danger of a hard heat-affected zone, though this might be avoided by heat-treatment. Malleable cast-irons depended on heat-treatment for their properties, he went on, and bronze welding was the method employed here if salvage was considered at all. White iron, either unalloyed or alloyed (Ni-Hard), was very difficult to weld, as the cracking hazard was very great. Austenitic cast-irons (Ni-Resist) could be welded with similar materials, or with Monel or Ni Fe rods, without difficulty, but distortion risks were greater. The author concluded by saying that the overall mechanical properties of welded joints in cast iron might be summarized by the statement that these could be made to match the parent metal if joints were properly made.

Company News

wart Iron & Steel Works, Limited—There
loss of £15,869 (profit of £24,434) for the year
30, 1959. No dividend is being paid on the
.

land Bridge & Engineering Company,
—The chairman, Mr. J. R. Dixon, states that
r-book is good at present and there is also
for new work in the shops and also in the
ing field. Inquiries are expected for a con-
amount of bridgework for new road and
improvements.

o, Limited (formerly Kay & Company
rs), Limited), engineers, machinists, and brass-
, of Bolton—Final dividend for the 18 months
eptember 30, 1959, is 40 per cent. making 100
t. (60 per cent. including interim paid with
year). Group net profit is £286,425 (£130,258)
K tax of £296,584 (£144,921).

Bentall & Company, Limited, agricultural
s and ironfounders, of Malden (Essex)—The
propose to increase the capital to £500,000 by
tion of 800,000 ordinary 5s. shares. The increase
ess of the amount of new capital which would
lved in the rights issue now under considera-
here will be an extra-ordinary meeting on
11.

nd Bright Drawn Steel & Engineering Com-
imited—All the issued share capital of the
Engineering Company (Nottingham), Limited,
acquired for cash. It is stated that this further
on will extend the scope of the group's already
e activity in the manufacture of precision
d parts and will be another outlet for the bright
rs and wires produced by the company and its
ry, A. E. Godrich & Son, Limited.

(West Bromwich), Limited, manufacturers
ineers to the building trades, of West Brom-
he chairman, Mr. J. MacNish, states that trad-
the first three months of the current year is
lerable improvement over the same period a
and with the rather healthier conditions pre-
in the industry the outlook for 1959-60 is
g. Due to a change in the company's financial
next accounts will cover the 17 months ending
mber 31, 1960.

es Churchill & Company, Limited, machinery
l merchants, etc., of Birmingham—During the
ht months of the current financial year order
s slightly greater than 50 per cent. up on the
year, states the chairman, Mr. J. B. S. Gabriel.
rovement has been particularly noticeable since
inning of September, with a "marked jump"
mber. The board is confident that the present
l continue. It is stated that the improvement
however, affect the immediate trading position.

dividend of Stewarts and Lloyds, Limited,
ained at 8 per cent., making 11 per cent. on the
000 capital, as previously. A total of not less
per cent. has also been forecast for the current
the £27,000,000 capital as increased by the
sue in October. The directors state that the
ment in trade announced at the time of the
s continued, apart from business with the oil
ies. Group trading profit decreased by
00 to £11,077,000 in the 53 weeks to October
. after increased depreciation of £3,394,000,
£2,874,000. Net profit is down from £6,912,000
9,000.

ISI Translations

In the latest list of translations issued by the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1, it is recorded that the following is now in course of preparation:—

1528 The Use of Computers for Controlling Arc Furnaces, Efroimovich, U.E., *Stal*, 1957, July, pp. 602-608.

Translations which have been made recently by Mr. H. Brutcher, of Technical Translations, P.O. Box 157, Altadena, California, USA (to whom enquiries should be addressed) include:—

HB 4760 The "Shaking Ladle," A New Metallurgical Tool, Eketorp, S. *Jernkont. Ann.*, 1959, (8), pp. 487-507.

HB 4758 Mechanism of Desulphurization of Hot Metal with Solid Lime, Gromov, M. I., and L. M. Tsylev. *Ibid.*, pp. 25-28.

HB 4756 Effect of Primary Structure of Steel on Propensity to Hot-tearing, Moldavskii, O. D., and A. P. Pronov. *Ibid.*, pp. 47-51.

HB 4623 Ladle Desulphurization of Iron with Lime and Aluminium Suspended in a Gas, Sobolev, S. K., and G. N. Oiks, *Izvest. VUZ., Chern. Met.*, 1958, (11), pp. 3-8. ($4.90).

In the following list the initials SLA, etc., stand for the organization to which enquiries for translations should be made, quoting the reference numbers. The addresses are given below.

SLA LC 59-17246 Allakhverdiyev, G. A. "Determination of Soil Corrosion Characteristics for the protection of Underground Installations." *Khozyaystvo* (USSR) 1956, No. 2. pp. 18-22. mi. $2.40, ph. $3.30.

CDS I.T. 2302 Asano, E. "Analysis of Segregations in Heat-resistant Steels 16-15-6." *Tetsu to Hagane*, 1957, vol. 43, No. 12, pp. 1318-25.

ID-U 1959 (9) 657 Breaban, M. L. "Vergleichstafeln für STAS-GOST-DIN-N.F.-B.S.-ASTM- Normen für Gussteile aus nichtlegiertem oder schwachlegiertem Grauguss sowie Temperguss." *Standardizartsiya*, 1958, vol. 10, No. 4. pp. 186-90.

SLA LC 59-15781 Margulis, D. K. and Yu. P. Kholmogortsev. "Force and Stability Relationships in High-speed Drilling of Cast Iron." *Vestnik Mashin* (USSR) 1957, vol. 37, No. 4. pp. 41-47. mi. $1.80, ph. $1.80.

CDS I.T. 2656 Miyazaki, S. "Etude de l'acier de Moulage Austénitique su Manganèse." (en japonais) *Suiyokwaishi*, 1958, Sept. *13*. No. 7. pp. 478-82.

AEI T/1474 Oshchepkov, P. K. "Introscopy" (Non-destructive Testing) of Opaque Materials. Zavods Lab. 1959, *25*, (6) pp. 684-89.

CDS I.T. 2645 Pisarenko, G. A., S. G. Guterman, and P. V. Gubchevskii. "Fonte de haut fourneau à graphite-sphéroidal" (en russe) *Liteinoe Proizv.* 1959, No. 1, pp. 12-13.

AEI T/1467 Pomey, J., A. Royez and J. P. Georges. "High Temperature Hardness." *Rev. Metall.* 1959, *56*, (3) pp. 215-228.

Symbols for sources of translations:—

SLA: SLA Translation Centre, John Crerar Library, 86, East Randolph Street, Chicago 1, Illinois, USA. IDU: Institut für Dokumentation Ubersetzungsnachveis, East Berlin, W.8, Unter den Linden 8, Germany. CDS: Centre de Documentation Sidérurgique, 6 Rue de Lota, Paris 16, France. AEI: Associated Electrical Industries, Limited, Research Laboratory, Aldermaston Court, Aldermaston, Berkshire. Where the title is quoted in a foreign language the original article has been translated into that language.

"Gas at Work in Industry" Exhibition

An exhibition illustrating "Gas at Work in Industry," sponsored by four of the Area Gas Boards—Eastern, North Thames, South Eastern and Southern, will be held at the Royal Horticultural Hall, Westminster, from March 1 to 12. Besides working plants, models, photographs, films, etc., there will also be demonstrations of steel melting, tinning, die-casting, special-purpose plant for the heat-treatment of metals, and the vitreous enamelling of aluminium.

Personal

Dr. **W. G. Hiscock** has been appointed chairman for 1960 of the Lead Development Association.

Mr. **A. A. Marsh** has been appointed manager of the National Steel Foundry (1914), Limited, Leven, Fife.

Sir **Owen Wansbrough-Jones**, K.B.E., C.B., has been appointed a director of the British Oxygen Company, Limited.

Brigadier **William Brooks**, O.B.E., has retired from the board of the Aurora Gear and Engineering Company, Limited, Edmund Road, Sheffield.

Mr. **A. I. Baker**, C.B.E., J.P., M.A., M.I.MECH.E., chairman of Baker Perkins, Limited, has been elected president of the British Engineers' Association.

Lord Hailsham, Lord Privy Seal and Minister of Science, is to be the chief guest at the Cutlers' Feast to be held at Sheffield Cutlers' Hall on March 29, 1960.

Mr. **C. W. McDonald**, formerly director and works manager of Guy Motors, Limited, has been appointed production manager at the Villiers Engineering Company, Limited.

Mr. **G. M. Wells** has been appointed assistant managing director of Hopkinsons, Limited, Huddersfield. Mr. **J. A. Fuller** is appointed chief engineer in succession to Mr. **G. Sewell** (director), who retired on December 22.

Mr. **A. O. R. Johnson**, managing director of T. H. & J. Daniels, Limited, founders and mechanical hydraulic engineers, Stroud, Glos, has been elected a director of a subsidiary company, British Boiler Accessories, Limited.

Sir **George Dowty**, chairman, Mr. **R. F. Hunt**, Mr. **Donald Campbell**, C.B.E., Mr. **L. S. Flatman**, general manager, and Mr. **C. J. Luby** have been appointed to the board of Dowty Marine, Limited, the recently-formed subsidiary of the Dowty group.

Mr. **Jack Bray** and Mr. **Robert Burman**, who have been with J. Parkinson & Son, Limited, machine-tool manufacturers, Shipley, Yorkshire, for 54 and 51 years respectively, have each received a presentation in recognition of their service with the company.

Mr. **Joseph Richards**, the deputy chairman, has been elected chairman of Wombwell Foundry & Engineering Company, Limited, in the place of Mr. **Francis Hill-Cole**, who has resigned owing to ill-health. Mr. Hill-Cole is to continue as a member of the board.

Mr. **M. J. Glenny**, chairman of the Council of Ironfoundry Associations, has accepted the invitation of the National Society of Master Patternmakers to be guest of honour at the Society's annual dinner/dance to be held at the Grand Hotel, Brighton, on May 21, 1960.

Sheffield University Council has conferred the title of Visiting Professor on Professor **O. Michejda**, Dean of the Mechanical Engineering Department, Politechnika Czestochawska, Szestochowa, Poland, who will be visiting the Department of Mechanical Engineering from January to September, 1960.

Mr. **Reginald Ibison** has been appointed to succeed Mr. **Christopher Stephenson** on the boards of R. & W. Hawthorn Leslie & Company, Limited, and its subsidiaries. Mr. Stephenson retires to-day (Thursday). Mr. Ibison will also succeed Mr. Stephenson as general manager of Hawthorn Leslie (Shipbuilders), Limited.

Mr. **Brian P. Yates**, secretary of Low Moor Alloy Steel Works, Limited, has been appointed a director. He has been associated with the company for 19 years, and has been secretary since 1945. He is also secretary of Low Moor Fine Steels, Limited, a subsidiary of the Low Moor Steel Works, and secretary of Yorkshire Rolling Mills, Limited.

Mr. **C. E. Holmstrom**, who became a director of John Bedford & Sons, Limited, of Sheffield in April, has been appointed chairman of the company in succession to the **Earl of Denbigh**. The Earl, who has resigned owing to the pressure of other business, is to retire as a director at the end of March, on his return from a business trip to South Africa.

Mr. **T. M. Horn** has retired from the position of manager of the Leeds branch of Atlas Copco (Great Britain), Limited, and Mr. **A. W. Tombleson**, from the Manchester branch, succeeds him. Concurrent with this change, the existing Leeds area has been divided and a new branch office is being established in Newcastle, with Mr. **W. Hossent** as manager.

At the annual meeting of the *Association Technique de Fonderie*, the *Grande Médaille d'Honneur* of the Association was awarded to Mr. **Achille Brizon**; gold medals were awarded to Mr. **Jacques Boucher** and Mr. **Henri Perchat**; silver medals to Mr. **Louis Grand**, Mr. **Albert Levasseur** and Mr. **Georges Ulmer**; and bronze medals to Mr. **Francois Danis** and Mr. **Pierre Huberson**.

Major **F. W. Smith**, chairman and managing director of the Enfield Cycle Company, Limited, Redditch, received a gold watch for 50 years' service with the company at a long-service awards presentation on December 15. He was handed the award by his son, Mr. B. W. Smith, a director of the company. At the ceremony certificates for 25 years service were presented to eight men and three women.

Dr. **John C. Wright**, senior lecturer in metallurgy at Birmingham College of Advanced Technology, has been appointed Reader in Industrial Metallurgy at the College. Aged 29, he joined the staff of the Department of Metallurgy last year. Dr. Wright began his career as a research assistant in the development and research department of the Mond Nickel Company, Limited, with which company he was associated from 1948 to 1954. He is a graduate in Metallurgy of London University. For a year he was technical officer in the research department of Metals Division of Imperial Chemical Industries, Limited, at Witton. He was awarded a PH.D. for his work on solid-fuel-fired gas-turbines.

Obituary

After 42 years' service, Mr. **Wilfred Brian**, chief designer for Brook Motors, Limited, Huddersfield, has died suddenly at the age of 56. He was a past-president of the Huddersfield Engineering Society.

The death is announced of Mr. **Bertram Kidson**, the well-known Wolverhampton accountant, on December 11. Mr. Kidson was associated with Edward Matthews, Limited, of Bilston, for over 40 years, and was chairman from 1946 until the time of his death.

Mr. **Thomas Arthur Barker**, who began work with J. & J. Horsfield, Limited, boilermakers, structural engineers, and ironfounders, of Dewsbury, in 1898, becoming a director in 1950, has died at the age of 76. He was appointed secretary of the company in 1929.

Industry in the Midlands

At a meeting of the Midland Regional Board for Industry in Birmingham, Major C. R. Dibben said that statistics showed that unemployment in the region had fallen from 24,710 to 22,428 between October and November, thus reaching an overall figure of one per cent. This is the best regional figure in the country and only half the national average, Major Dibben said. The number of vacancies in the region stood at 30,305.

Speaking at the press conference following the Board meeting, Major Dibben said that the Midlands had been the only region in the UK to record a substantial drop in unemployment over the last month. "The industrial outlook remains set fair with prospects of more improvement yet." District advisory committees reported an increased shortage of raw materials especially in sheet steel and to a less extent in the alloy steels, but up to the present there had been no "real sense of frustration caused by the shortages," Major Dibben went on. Exports were buoyant although it was anticipated that there might be some contraction in the buying of consumer goods at the end of the year. The output and sales of plant and machinery were beginning to rise significantly in response to heightened demand.

Labour was the chief shortage causing concern and it was definitely putting a check on development, Major Dibben said. There was still very little sign of significant movement of industry from the prosperous Midlands to the major unemployment areas elsewhere. Relocation of industry in areas of high unemployment was, said Major Dibben, "a national problem and we, as the most favoured region in the country, should be prepared if necessary to make some sacrifices towards its solution." Major Dibben went on to say that the congestion in the Midland region was such that any future development must be to some extent retarded.

Teacher Training Courses

Next year, teachers serving in technical colleges will again have the opportunity of going to one of the Technical Teacher Training Colleges for a term's course of teacher training. These "in-service" courses were held for the first time this summer, when nearly 150 teachers were seconded by their employers. Numbers next year promise to be even greater. The courses are intended for those teachers with academic qualifications who have entered technical colleges direct from industry. They are aimed at improving the quality of teaching and thus helping to increase the number of successful technical students. Courses will start after Easter at the three technical training colleges—Bolton, Huddersfield and London (Garnett College) and at the College of Technology, Wolverhampton. The Huddersfield College will also run a course in February.

Lancashire Steel raises its Dividend

Total dividend of the Lancashire Steel Corporation, Limited, is effectively raised from 7 per cent. to 8½ per cent. with a final of 6 per cent., against the forecast of 5½ per cent., on capital doubled by a scrip issue. After heavier provisions for depreciation and replacement, group profits amounted to £3,873,440 for the 53 weeks to October 3, 1959, compared with £2,985,989 for the previous 52 weeks' period.

Taxation charges are up by £200,000 at £1,950,000, and the net balance of £1,923,440 compares with £1,235,989.

Stanley Parsons' 150th Anniversary

This month Stanley Parsons & Company, Limited, makers of weighbridges, weighing machines, etc., St. George's Ironworks, Bradford, celebrated the foundation of the company in 1809 by two Yorkshiremen, Mr. John Hill and Mr. James Brayshaw. The present directors and 80 members of the staff attended a 150th anniversary dinner at the Midland Hotel, Bradford, on December 14.

When Mr. Hill took Mr. Brayshaw into partnership they dealt principally in scales for wool and corn and established a lasting reputation for good craftsmanship and accuracy. Later, James Brayshaw became proprietor of the firm, and, when he was joined by his son, Charles, it became known as James Brayshaw and Son with premises in Booth Street, Bradford. Eventually it was bought as a sideline speculation by Mr. Stanley Parsons, a son of the governing director of Taylor & Parsons, Limited, Bradford, and in 1920 the name was changed to S. Parsons & Company, Limited.

With the move to the present premises in Young Street in 1938, the firm was enabled to make larger capacity machines and to begin manufacture of many types and sizes including dials, hopper weighers and automatic weighers. Mr. Parsons, chairman and governing director of the company died in 1947, but during his lifetime the business had become world famous and its products now find markets all over the world.

POA Course on Materials

The Purchasing Officers Association announces that the third Oxford course is to be held at Christ Church and Pembroke College from March 21 to 25. The course will include for the first time material study groups (in co-operation with the British Iron and Steel Federation and the British Non-Ferrous Metals Federation) and an operations research study group.

In addition to an address by Professor R. W. Revans, B.SC., PH.D., Professor of Industrial Administration, Manchester College of Science and Technology on "The Meaning of Administration," there will also be a panel discussion on "The Effect on Buying Policy and Practice of Current Restrictive Practices Legislation" between Mr. R. L. Sich, C.B.E., Registrar of Restrictive Trading Agreements, Mr. A. H. Thomas, president of POA, and a spokesman from industry.

The fee for full-time attendance at the course will be £25 per person, and a full programme may be obtained from the secretary of the Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

Information Centre in Bagdad

For the convenience of businessmen interested in Anglo-Iraqi trade a United Kingdom commercial office has been opened by the British Embassy in the centre of the business quarter of Bagdad. The new office which is situated in the Ottoman Bank Building, New Bank Street, Bagdad, will function as a commercial information centre and a complete service is available for answering commercial enquiries. Facilities include a reading room containing a comprehensive set of trade periodicals and a library of catalogues and other commercial literature provided by United Kingdom firms. Enquiries relating to this announcement should be addressed to the Board of Trade, Commercial Relations & Exports Department, Horse Guards Avenue, Whitehall, London, S.W.1, quoting CRE/1382/G.

Publications Received

Spheroidal-graphite Iron. An excellent brochure, *S.G. Iron: Properties and Applications*, has been published by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1. The covers of the booklet have been carried out as photomicrographs showing the typical nodules always associated with s.-g. iron, and no better introduction to the subject could be given. The brochure opens with a straightforward account of what this iron is and describes the main types. Then, using a series of tables, the material's mechanical properties as-cast and heat-treated are detailed. A system is then followed of taking one property at a time and illustrating its application by showing pictures of castings particularly demanding this attribute. By the luck of the game, all the early illustrations in the booklet are of components made by overseas firms, but, later, founders in this country come in for their fair share. Page 29 of this 36-page well-illustrated brochure introduces a seven-page list of engineering components with a letter, or letters, at the side of each to indicate the more favourable types of iron to use. The reviewer suggests that when circularizing this brochure a list at least of British licensees should be included.

Accidents—How they happen and how to prevent them. No. 41. Published by H.M. Factory Inspectorate through Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2.

Under "Comment" in this issue there is the reminder that on January 1, 1960 there come into force new regulations covering the minimum contents of first-aid boxes. These are detailed in "Form No. 1008: First Aid," obtainable from H.M. Stationery Office, address as above, price 2d. (probably 4d. post free). The contents of this issue are different from the earlier ones insomuch as there is less stress placed on the risks of specific industries and more on accidents which might happen in any works. This obviously makes the publication more practical and interesting for all.

Transport Age, Vol. 2, No. 11. Published by British Transport Commission, 222, Marylebone Road, London, N.W.1.

The reviewer has quite an affection for this publication and would welcome its appearance in his dentist's or doctor's waiting room to replace the "glossies" specially directed to housewives and teenagers. It is exceptionally well produced, the colour illustrations in fact merit the designation of excellent. This issue covers *inter alia*, Gleneagles Hotel, Bristol as an industrial centre, and heavy haulage—which latter even to-day borders on the romantic, except of course for the motorist in a hurry! The magazine is perhaps the best publicity for British Transport launched by the Commission.

Improved Material Utilization. Published by the Institution of Production Engineers, 10, Chesterfield Street, Mayfair, London, W.1; price 13s. 6d. post free.

This report is the work of four committees covering finishes and finishing materials, packaging and shipping materials, ceramics, metal powders and plastics, and ancillary processing materials. Over 80 case-studies are included, some of which will give satisfaction to the foundry industry (at least, that section making precision castings), whilst those dealing with powdered metals may cause a little apprehension. Every reader of this book will find some new application of interest, particularly the innovations in steelfoundry practice, [illegible]ing of castings, and vitreous enamelling.

Induction Motors. The English Electric Company, Limited, Stafford, have issued two well-produced, excellently-illustrated catalogues covering induction motors. No. PS/133 is a 12-page publication dealing with large squirrel-cage (class L) and slip-ring (class LS) induction motors for speeds up to 1,800 r.p.m. and heavy outputs. For these motors seven different types of enclosures are available. The other catalogue, No. DM/257, covers a range of high-torque, high-slip squirrel-cage induction motors which have been specially designed for applications involving high inertia and frequent load changes. The range is from one to 20 h.p.

Engineering Products. Two 24-page leaflets "What We Make" (No. 5/464) and "Engineering Products" (No. 1/526), have been issued by Ransomes & Rapier, Limited, Ipswich and London. The last-named leaflet is interesting as it carries a series of pictures of the company's drawing office, patternshop, the foundry and machine shops, and finishes off with the various erecting and fitting shops. The second leaflet illustrates a representative collection of the machines for which the firm is noted, such as the W1400 walking dragline.

Coke-burning Appliances Handbook (6th edition). Published by the Gas Council (Coke Department), 1, Grosvenor Place, London, S.W.1; price 35s.

This book is an invaluable work of references for builders' merchants as it details, and illustrates with diagrams and pictures, the leading makes of stoves, cookers and boilers, all of which have been approved for efficiency.

Miniature Fluorescent Lighting Fitting. In leaflet No. L300/1, Victor Products (Wallsend), Limited, Wallsend-on-Tyne, give a very full description of fittings they have designed for 12-in. 8-w. tubular fluorescent lamps, which are supplied with the lamps fitted. The leaflet goes into all the technical details and the reviewer can only add that it is a good-looking job.

House Organs

The Stantonian, Vol. 21, No. 9. Issued by the Stanton Ironworks Company, Limited, near Nottingham.

This issue records what is quite a milestone in the history of the company, namely, the official opening of the new ore-preparation plant,* together with a technical description of it. The co-ordination of all the various units to ensure the designed output of 25,000 to 30,000 tons per week is unquestionably an outstanding feat of metallurgical engineering. The cover and the centre-page spread have been used to print excellent coloured pictures of the new plant.

Nickel Bulletin—November, 1959. Published by The Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

This issue illustrates the major role played by nickel-containing materials in applications requiring heat—and/or corrosion-resistance. Items of interest in this connection range from the development of precipitation-hardening stainless-steels to vacuum-melting.

Broomwade News Bulletin, Vol. 22, No. 4. Issued by Broom & Wade, Limited, High Wycombe, Bucks.

This issue tells of the overseas activities of the company, especially in Canada and the USA.

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* See JOURNAL, December 10, 1959.

Law Cases

o maintain Precautions

lure of Stewarts and Lloyds, Limited, Clydes-
ks, Mossend, Lanarkshire, to take all reason-
to ensure the safety of employees working
inity of an overhead crane led to their being
by Sheriff Wood in Hamilton Sheriff Court.
spector of Factories, who prosecuted, ex-
at on November 1 a fitter and two labourers
ting a screen between the machine-shop bay
cutting-shop bay. This was being done, he
use sparks from a large circular saw in the
op was causing inconvenience to men work-
machine-shop bay. Overhead cranes operated
ays. After the screen had been erected, it
led to strengthen it by putting bracing bars
. One of the labourers, Robert Drench
climbed a ladder to fix the brace and while
placed his hand on the travel rail of the
crane. As a result the crane travelled over
which was completely severed. Murray
to retain his balance on the ladder and other
went to his assistance. The Factory Act
s made it imperative that the crane driver
ave been warned that men were working in
ty of the crane, but it was not done in this

itor for the firm said that a foolproof system
ng had been laid down by the management,
rtunately, on this occasion, it had not been
full operation. The foreman in charge,
been acting as lookout to see that the over-
e did not approach too close, left after the
sheet had been placed in position.

amages for Burned Workman

ear-old Glasgow labourer whose foot was
ith molten metal as he moved weights from
as awarded £2,800 damages in the Court of
Mr. Robert Burns who sued Dixon's Iron
imited, Crown Street, Glasgow, for £5,000,
as standing on sand when it gave way and
etal ran into one of his clogs. He was
burned on the foot and ankle and was in
for six months. Burns said he may have to
amputation below the right knee. The com-
nying liability, claimed their system of work-
not dangerous. They said it was Burns' fault
e stood too near the edge of the sand when
ent happened. The jury assessed damages
and said the company was three-quarters to

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terials Prices Indices

ally because the price of raw rubber,
lling in October, rose sharply last month
per, zinc, and raw cotton showed increases.
esale price index of basic materials and fuel
manufacturing industry rose again in Novem-
fourth month running. The provisional figure
0.4 per cent. to 102.6 (1954=100), compared
.5 a year ago.

creased prices of raw rubber, copper, and
n-ferrous metals were reflected in the indices
rials and fuel used in the electrical machinery
and the mechanical engineering industries,
se by 0.8 per cent. and 0.7 per cent., respec-
Manufacturers' wholesale prices do not yet
e change having risen by only 0.1 per cent. to
year ago the figure was 111.3 for all sales and
r home-market sales.

Foundry Equipment's Silver Jubilee

On January 27, Foundry Equipment, Limited, celebrates its 25th anniversary as a manufacturing concern at Leighton Buzzard. At a meeting in the main works on December 22, Mr. A. S. Beech, M.I.MECH.E., chairman and managing director, addressing personnel said that during the last three months, the company had received a considerable number of orders for foundry installations and machines, not only from Great Britain and other European countries, but also from USA, Canada, Australia and South Africa. The increase in plant orders for the UK indicated that the two-year period during which the heavy engineering industry in this country had been generally slack was ending.

The company had for many years maintained a good export trade, he continued, and with the advent of new overseas companies in Australia, the USA, South Africa and most recently in Spain, the percentage of export business was increasing yearly, amounting to 58 per cent. of the total during the six months ending on September 30, 1959. Mr. Beech also said that their associated company, F. E. (North America), Limited, Toronto, Canada, had obtained an order for a complete continuous casting plant for an iron foundry in New York State, and that another order was coming through almost immediately for a foundry in Tucson, Arizona.

Another purpose of the meeting was to present gold-watches to five employees who had each completed 20 years' service. Mr. Beech said that these presentations brought the total of long-service employees (those with 20 years' service) up to 18 and the grand total of service represented well over 400 years.

ECSC Steel and Pig-iron Output

Output of crude steel (ingots and castings) in the European Coal and Steel Community in November was lower than the previous month's record total, but still the second highest monthly figure ever recorded.

Production figures place the November output at 5,715,000 *tonnes*, against 5,984,000 *tonnes* in October and 4,583,000 *tonnes* in November, 1958. Production declined slightly in all six Community countries from the record October levels, but this is expected as a normal seasonal occurrence.

The November figures brought output for the first 11 months of the year to 57,519,000 *tonnes*—7.8 per cent. more than the 53,430,000 *tonnes* for the corresponding period last year.

Output of pig-iron and ferro-alloys also declined slightly to 4,167,000 *tonnes*, compared with 4,320,000 in October and 3,525,000 in November, 1958. For the first 11 months output amounted to 42,434,000 *tonnes*—6.1 per cent. more than the 39,996,000 *tonnes* produced in the January-November period, 1958.

Skinningrove Iron Company's Development

Whole of the development scheme put forward by the Skinningrove Iron Company, Limited, Saltburn-by-the-Sea (Yorks), earlier this year has now been officially endorsed. Total expenditure involved in the scheme is about £1,000,000.

The two new housings for the 36-in. rolling mill are now being made and will be installed next August. Work on the new crushing, screening, and sintering plant for the preparation of blast-furnace ores will start as soon as possible.

News in Brief

Sir Stuart Goodwin, the Sheffield industrialist, and Lady Goodwin, have given £60,000 to Sheffield University towards the provision of a swimming bath, the total cost of which will be between £90,000 and £95,000. Sir Stuart and Lady Goodwin had already donated £30,000 towards a new gymnasium being erected at the University.

Regie Nationale Renault, France's largest automobile company, has moved into sixth place among car and truck builders in the world. The company now manufactures 2,250 vehicles a day, including 1,700 "Dauphine" cars. During the first half of 1959, Renault shipped 131,608 vehicles or 53½ per cent. of its output for delivery abroad.

Richard Dunston, Limited, shipbuilders, Thorne, near Doncaster, have secured an order for two 100-ft. trawlers from the Colne Fishing Company, of Lowestoft. These will increase the Colne fleet to 29, five of which were built by the Thorne firm. The trawlers will have hydraulic steering, and an echometer for finding shoals of fish.

Mr. L. Cleaver, M.P. for Yardley, Birmingham, has asked the Chancellor of the Exchequer if he would consider removing the 12½ per cent. purchase tax imposed on cast-iron holloware, so as to encourage the ironfoundry industry, which has been in difficulties due to the credit squeeze. Sir Edward Boyle replied that the matter would be borne in mind.

Dr. W. C. Winegard, associate Professor of Metallurgy in the University of Toronto, will be the lecturer at a meeting of the metal physics committee of the Institute of Metals to be held at the Institute's headquarters, 17, Belgrave Square, London, S.W.1, on February 10, 1960, commencing 6.30 p.m. The subject of the lecture will be "Solidification of Alloys."

Daystrom Incorporated, has opened a new manufacturing plant for electronic and electrical products, at Gloucester. The new firm—known as Daystrom, Limited—has been operating in leased premises in Gloucester for the past year. The managing director is Mr. A. E. B. Perrigo. The new building, which houses plant and offices, covers 10,000 sq. ft., and is designed for expansion to 70,000 sq. ft.

The British Transport Commission has placed an order with Yorkshire Engine Company, Limited, Sheffield (a subsidiary of the United Steel Companies, Limited), for the supply of 10 170 h.p. diesel-hydraulic shunting locomotives. Delivery will take place in 1960. The locomotives will be used on the London Midland region of British Railways, principally in the Manchester and Liverpool dock areas.

Sheffield firms exhibiting at the British Exhibition in New York next June include Thos. Firth and John Brown, Limited,—a fully-hardened forged-steel roll: Samuel Fox and Company, Limited,—razor-blade and watchspring steel: Hadfields, Limited,—an extrusion press liner and a Boron "sandwich" plate as used for reactors. In the steel section there will be a special display of Sheffield hand-tools and stainless-steel cutlery.

The Rolls-Royce factory at Mountsorrell, North Leicestershire, which was almost completely destroyed by fire seven months ago has been completely rebuilt, and will be back in production by the end of January. The factory makes sheet-metal assemblies for jet-aircraft engines and many of the 1,000 employees who were found temporary work in other Rolls-Royce factories in the Derby area, have returned to Mountsorrell.

£3,000 has been donated by the Department of Scientific and Industrial Research, to the metallurgy section of Rotherham College of Technology in recognition of the work of Mr. D. Yarnton in powder metallurgy, said Mr. G. E. Cooke, the principal, at the annual prize distribution on December 11. The money was being devoted to the employment of a full-time assistant and also to the purchase of extra equipment.

Heyes & Company, Limited, Wigan, have received an order from the North Western division of the National Coal Board, for two sets of the type-40 shaft-signalling system for use in Parkside Colliery, which the division is preparing for use at Newton-le-Willows. Since the introduction of the type-40 indicator earlier this year, the company has received orders from six divisions of the NCB. The system will be installed in Parkside in the spring.

An order for five sets of combined change-over and safety valves for the UK Atomic Energy Commission has been received by Cockburns, Limited, Glasgow. The valves of the Cockburn patent full-bore type, with deadweight control valves, are for Windscale nuclear power-station in Cumberland. In addition to Windscale, the company has supplied valves and fittings to the nuclear power-stations at Bradwell, Hinkley Point and Hunterston.

Davy and United Engineering Company, Limited, Sheffield, have secured the contract, valued at more than £4,000,000, for the building of the 68-in.-wide hot strip mill for the new Spencer works at Newport, Monmouthshire, for Richard Thomas & Baldwins, Limited. The mill will go into production in October, 1961, with an initial output of about 1,000,000 tons of strip steel a year, but designed for an eventual output of about 3,000,000 tons a year.

Work on schemes totalling £2,000,000 to expand the production capacity for stainless steel is being undertaken by Samuel Fox & Company, Limited, a subsidiary of the United Steel Companies, Limited. Present production at Stocksbridge is over 1,000 tons a week. Recently, Samuel Fox announced a £1,000,000 project to modernize their Stocksbridge hot mill which, by the middle of 1960, will enable them to produce sheets and plates up to ½-in. thick and 6-ft. wide.

Gardners, Limited, of Patricroft, near Manchester, received orders during the month of November for over 350 automotive engines, LWs and 6LXs, from leading chassis manufacturers in this country. Orders were also secured for 84 rail traction engines, of which 68 were for use in South Africa. Many marine-propulsion engines were also ordered and over 100 engines for installation in earth-moving machinery, trenchers, air compressors and other road-making machinery.

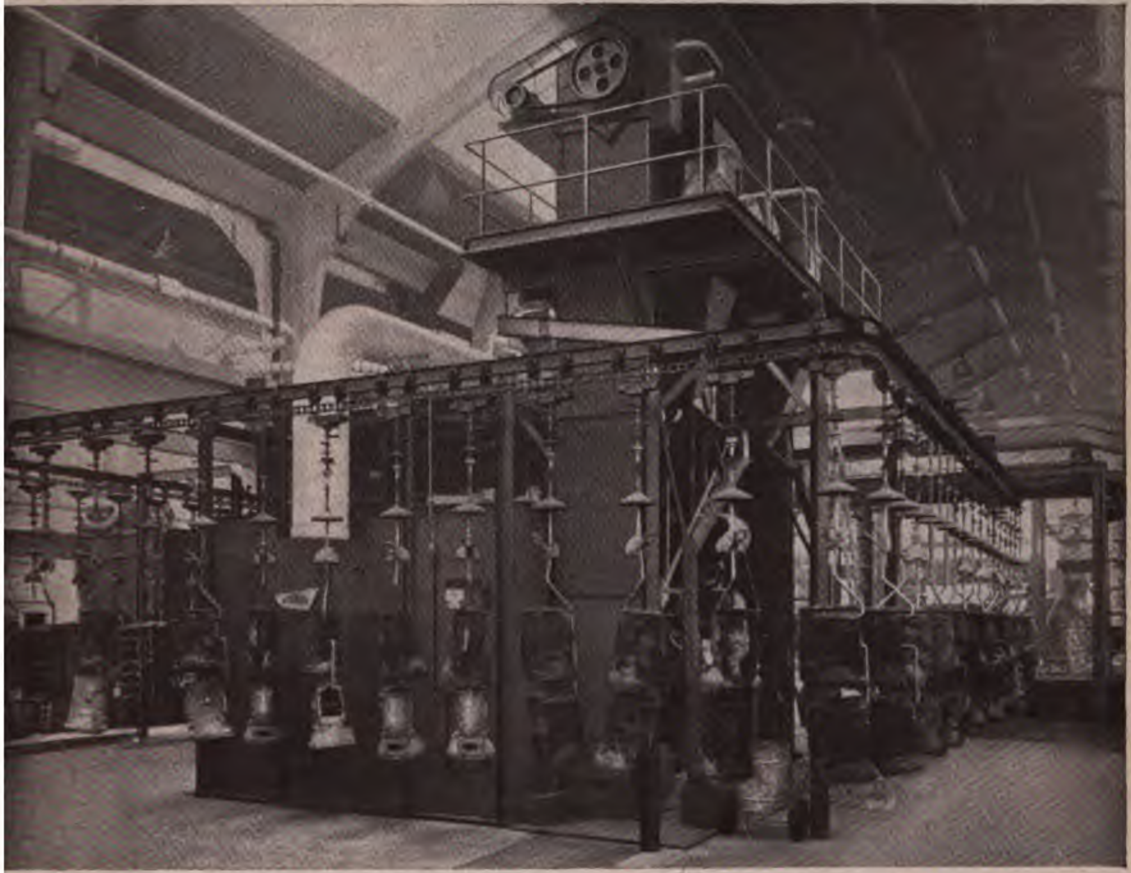
Sheffield University's third business-studies course for future senior executives in industry, commerce and public service will begin in June 1960. It will take place at Stephenson Hall in six successive University vacations, ending in April 1962. There are six residential sessions of a fortnight each and they are designed to provide short periods of intensive work with interchange of ideas between members, without taking men away from their firms for more than two weeks at a time.

The Minister of Housing and Local Government, Mr. Henry Brooke, is to meet the Sheffield and District Clean Air Committee to discuss the control of Sheffield's atmosphere. In his last proposals before Parliament's summer recess, the Minister proposed a partial control of furnaces up to a certain tonnage by the Sheffield Corporation, and excluded larger furnaces from their

(*Continued on page* 688)

Overhead Monorail Conveyor Cleaning Plants

at Sterling Metals Ltd., Nuneaton



The illustration shows one of two overhead monorail conveyor cleaning plants installed at Messrs. Sterling Metals Ltd., Nuneaton. The machines are engaged in cleaning automobile component castings which pass through the 23ft. by 13ft. 6in. by 10ft. high cabinet and are thoroughly blasted by four centrifugal shot blast wheel units.

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News in Brief

(*Continued from page* 686)

control. Since then, Sheffield Corporation has asked for even greater powers in the matter, while industry is opposed to them.

The Yorkshire Division of the Central Electricity Board is to open a training school at Doncaster power-station for staff of future nuclear power-stations. Apprentices will be trained not only in the operation of coal-fired power-stations, but in the maintenance, operating and managing of nuclear stations. The first intake of trainees will start a sandwich course preparing them for a diploma in electrical engineering to university degree standard, and ultimately membership of the Institution of Electrical Engineers. A second training school is to be opened at Leeds.

An order for a £1,000,000 bulk carrier of 15,000 tons dw. has been placed with Lithgows, Limited, Port Glasgow, by A/S Kristian Jebsens Rederei, of Bergen, Norway. Lithgows state that the order had been obtained in fierce competition with foreign shipyards and at a very keen price. This order is only the second foreign contract to be obtained by British shipyards this year. The first also went to a firm of the Lithgows group, the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, and was for nine ferries, valued at £3,500,000, for Turkey.

Subject to negotiations being satisfactorily completed with the owner of the property, the Northern Aluminium Company, Limited, of Britain, will erect a £2,250,000 aluminium fabricating mill at Wiri, about 15 miles south of Auckland, New Zealand. The company hopes to start construction early in the new year. Plans of the proposed plant were presented to the Manukau County Council with request for permission to build, and although permission was given in principle, confirmation was withheld until the Council was satisfied there would be no fumes nuisance.

A trade in old gas lamps from Sheffield is being built up with the United States. After a woman from California had taken two back with her from the Sheffield lighting department headquarters last summer, she sent an order for 75 more. She wrote to say that they were being used not only for lighting, but also as hanging containers for indoor trailing plants, bird cages, and even made water-tight to keep goldfish in. The department also sells some lamps locally. They are sold for scrap value and the three sizes cost between £2 5s. and £2 10s. each. There are still about 9,000 gas lamps being operated by the department but they will be gradually replaced.

A revised British Standard for the general dimensions of twist drills (B.S. 328: Part I 1959) will become effective from January 1. The new standard will conform to ISO recommendation No. 301. After many years of study, technical committee No. 29 of the International Standards Organization, on which 14 countries are represented, has reached agreement on recommended flute and overall lengths for standard types of twist drills. In comparison with existing national standards, British, American, German, French, etc., the new ISO recommendation has a more systematic diameter to flute-length ratio, given a more balanced relationship between diameter and flute lengths.

Middlesbrough will become a complete smoke-control area during the next 20 years on a plan approved by the Middlesbrough sanitary and baths committee. In addition to the use of smokeless fuel by industry, it will mean that fireplaces in 44,000 houses will be converted for smokeless fuel at a cost of about £750,000. This is expected to cost the Corporation £274,000 after Exchequer grants have been received. The first smokeless zone, in the Beechwood area, will come into operation next May, and in the next five years other residential parts of the town will become smoke-control zones. It was recently estimated that in the worst part of Middlesbrough, 440 tons of soot falls on each square mile every year.

P. G. Engineering, Limited (member of the Power-Gas Group), Stockton-on-Tees, has received instructions from the North Eastern Gas Board to build a plant, at the Whitby Gasworks, to reform natural gas. The installation will be the first of its kind for this application in this country. The plant will comprise three two-tube P. G. Hercules furnaces (two working and one standby) and will be designed to produce a total of 1,250,000 cub. ft. of town gas per day. The natural gas will be obtained from wells on the nearby North Yorkshire Moors and, in the event of failure of this supply, the plant will also be capable of producing town gas by the reforming of commercial butane. The plant is due for completion by July, 1960.

The purchase by Firth Cleveland, Limited, of Broadmead, Limited, as from January 4 1960, is announced by Mr. Charles W. Hayward, chairman and managing director of the former company. Broadmead, Limited, consists of approximately 300 retail branches throughout England, Scotland and Wales, dealing in radio, television, electrical and domestic appliances. Mr. John James, chairman of Broadmead, Limited, joins the board of Firth Cleveland, Limited. As a result of this acquisition Firth Cleveland now controls the largest chain of this kind in the world, with nearly 500 branches. The purchase price for Broadmead's was £5,800,000 of which half is payable in cash and the balance by the allotment of 2,416,667 4s. ordinary shares in Firth Cleveland.

Professor J. Nutting, senior lecturer in the Department of Metallurgy at Cambridge University, gave the Christmas Lecture to schoolchildren organized by the Birmingham Section of the Institute of Metals. There was an audience of over 600. Professor Nutting who showed specimens of uranium; a brass axehead dated *circa* 1,000 BC, and types of metal containers specially made to hold uranium, told his young listeners that there were tremendous problems in metallurgy but "they made life interesting." He appealed to the young people to consider becoming metallurgists. "The main requirement is for more men, men with very great imagination to see where these problems are and with skilled hands to carry out experiments," he said. "Then, when we have solved some of them, we need men with great skills to put the various devices and inventions into service."

Early in 1960 the Industrial Safety Division of the Royal Society for the Prevention of Accidents will begin its part in an international scheme intended to promote wider understanding of industrial safety and allied subjects. The essential aim of this scheme is to make information available on literature and legislation dealing with all aspects of occupational safety and health. Distribution of the information will be made through the International Labour Office by means of index cards. The cards, each with a classification code number, will consist of a complete index of subjects and cross references, and each item of information will appear on only one card. Cards will be obtainable. in complete sets only, from the national organizing centre which, in Great Britain, will be the Royal Society for the Prevention of Accidents, Artillery Mansions, 75, Victoria Street, London, S.W.1.

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Raw Material Markets

Iron and Steel

Many of the ironfoundries were closed for the Christmas holiday from Wednesday of last week until Monday or Tuesday of this week. Apart from the raw materials which are received by road, there was generally no suspension in deliveries owing to the present stringency in some supplies. Chief among these is the low-phosphorus pig-iron mainly used by the engineering and speciality foundries, as, on account of the scarcity of this grade of pig-iron, the foundries are anxious to obtain all available supplies. The demands made on makers of other brands of low-phosphorus irons are increasing daily, and in most cases orders on hand exceed production, with the result that they are committed for some weeks ahead. As stocks previously held by the furnaces have been entirely eliminated or considerably reduced, deliveries depend mainly on current production and this results in delays in despatch. Increased furnace capacity is expected to be brought into operation during this month and early next year, when three more furnaces are due to be burdened for the production of low-phosphorus pig-iron, and this should ease the present difficult supply position.

Most of the engineering and speciality foundries have heavy commitments for high-duty castings which call for substantial tonnages of the low-phosphorus irons, and, in addition, their demands for hematite have increased considerably recently, while a heavier call is also being made for the refined irons. Producers of basic pig-iron are receiving heavier demands for supplies from the steelworks, and these are being met satisfactorily from the increased outputs which are now being obtained.

There is no difficulty in securing adequate tonnages of the high-phosphorus pig-irons. Although demands for this grade are maintained at better levels, producers are able to cope with these and there are tonnages to spare both from stock and current outputs. Consignments continue to be shipped to overseas buyers and this is relieving the furnaces of some of their excess tonnages. Many of the light and jobbing foundries maintain their improved outputs of castings, and this has enabled them to take up larger tonnages of pig-iron.

There is a strong demand from the foundries for suitable parcels of both cast iron and steel scrap, with a persistent call for the better and heavier grades of cast-iron scrap. Deliveries of foundry coke are satisfactory, and ganister, limestone, and firebricks are available on demand.

The re-rollers have plenty of work on hand and there continues to be a good demand for all their products. Business is at a high level for small bars and light sections, and the mills supplying reinforcing bars are heavily committed. The chief anxiety of the re-rollers at present is to secure sufficient steel semis to enable them to implement the work on hand. They hold only meagre stocks and difficulty is being experienced in obtaining their full requirements of steel billets, blooms, and slabs for consumption and stock. Home steelworks are under heavy pressure for supplies and most of the steelworks have commitments which will absorb their total outputs for two or three months ahead.

Non-ferrous Metals

Although a number of agreements have been con*cluded between US* copper producers and the Mine, *Mill and Smelters*' Union, production at these mines has not been resumed. This lack of follow-through on the reported settlement of some of the strikes has made for cautious markets, which have yet to react to the full implication of an overall settlement. Meanwhile, in London the market is firm with cash metal still commanding over £16 a ton on three months' material. Part of this firmness can be attributed to the fact that when the US customs smelters recently returned to the New York market they raised their quoted price by 2 cents to 35 cents a pound. Producers are still quoting 33 cents a pound.

Overall, however, the high price quoted in London is due to the still not clear position with regard to the US copper strike situation and, in consequence, the shortage of metal. Another bullish factor which has reared its head this week has been the news that rock-breakers at Mufulira, on the Rhodesian Copperbelt, have imposed a ban on overtime. The outlook should be a good deal clearer this time next week. It will be interesting to see how markets react when the US copper strike is settled and production resumed on a broad front.

Tin has been an unsteady market in London, in Singapore, and in New York, where the price is less than 99 cents a pound. Demand on both sides of the Atlantic is desultory and stocks in London are rising. At the end of last week stocks of refined tin in LME warehouses rose 193 tons to 8,527 tons.

Lead is enjoying good trading conditions and the turnover in London is now reminiscent of that achieved in early November. The London price for cash metal is now around £74 a ton, while in New York the spot price is reasonably firm at 12 cents a pound. Zinc is a better market in New York than in London, where the offer from the Board of Trade to dispose of 3,000 tons from its stockpile has led to a decline in the cash and three months' quotation. However, prompt material is relatively scarce and the backwardation is approximately £5 a ton. The US price is still called 12½ cents a pound, East St. Louis.

Distington Foundry's Record Output

The iron foundry of Distington Engineering Company, Limited, a subsidiary of the United Steel Companies, Limited, produced 2,423 tons of finished castings during the week ending December 19. It is claimed that this sets up a new works', national and European record for one week's output from one iron foundry. The castings produced consisted of 379 ingot-moulds, in addition to a number of bottom-plates, slag ladles and general engineering castings. This achievement follows that of three previous weeks in each of which output exceeded 2,000 tons. Distington's iron foundry is working a 17-shift week, and the commissioning of a second hot-blast cupola, with continuous tapping, makes available a full week for furnace maintenance, as one furnace in blast at a time is proving sufficient to meet all the iron required for a week's production. The company's management state that the foundry order-book is very satisfactory, and there is every confidence that the large demand which this record output reflects will continue well into 1960.

THE NEXT quarterly general meeting of the National and Midland Ironfounders' Association is to be held at the Station Hotel, Dudley, on Wednesday, January 13. In addition to normal agenda, a lecture will be given by Mr. D. A. Taylor (of the British Cast Iron Research Association) who will talk on the subject of shell moulding.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

December 30, 1959

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 10s. 0d. to £44 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 0s. 0d. to £62 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £78 10s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £77 0s. 0d. to £80 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. Siemens Martin Acid (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £258 0s. 0d. to £258 10s. 0d.; three months, £241 0s. 0d. to £241 10s. 0d.; settlement, £258 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 6¼d. per lb.; rods, 278s. 6d. per cwt. basis; 20 s.w.g., 313s. 0d. per cwt.

Tin.—Cash, £785 0s. 0d. to £786 0s. 0d.; three months, £782 10s. 0d. to £783 0s. 0d.; settlement, £786 0s. 0d.

Lead (Refined Pig).—Second half December, £73 17s. 6d. to £74 0s. 0d.; second half March, £73 5s. 0d. to £73 10s. 0d.

Zinc.—Second half December, £95 7s. 6d. to £95 10s. 0d.; second half March, £90 0s. 0d. to £90 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £131 0s. 0d.; rolled zinc (boiler plates), all English destinations, £128 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 1d. per lb.; sheets to 10 w.g., 223s. 9d. per cwt.; wire, 2s. 10½d.; rolled metal, 223s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £167; B6, £219.

Brass (High Tensile).—BS1400, HTB1, £196; HTB2, £218; HTB3, £230.

Gunmetal.—BS1400, LG2, £209; LG3, £219; G1, ½%, £274; G1, 1%, £261.

Phosphor Bronze.—BS1400, PB1 (AID released), £30[illegible]; BS1400, 90/10/1, £288.

Leaded Phosphor Bronze.—BS1400, LPB1, £230.

Phosphor Bronze Strip, etc.—Strip, 315s. 6d. per cwt.; wire, 4s. 3½d. per lb.; rods, 3s. 7d.; tubes, 3s. 7d.; chill cast bars; solids 3s. 6½d.; cored 3s. 7½d. (Charles Clifford, Limited.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide x 0.056, 4s. 0d. per lb.; round wire, 10g in coils (10 per cent.), 4s. 5d.; special quality turning rod, 10 per cent. ½ in. dia., in straight lengths, 4s. 4d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. to £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £256; AB2, £266.

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* *Average 68-70 per cent.*

New Catalogues

Pyrometers. A leaflet, No. P.16, received from the Cambridge Instrument Company, Limited, 13, Grosvenor Place, London, S.W.1, describes a simple type of thermocouple for attaching to a pipe for measuring a range of temperatures (up to 300 deg. C.) of materials carried. It suggests itself as being suitable for hot-blast experiments in various types of furnaces, though it is shown applied to space-heating systems.

Bunker Cushions. Orthos (Engineering), Limited, 62, Coventry Road, Market Harborough, Leics., have issued a German catalogue, printed in English, originating from Clouth of Cologne. It deals with the question of material sticking in bunkers and hoppers. The solution offered is the insertion in the side of the hopper of rubber pads, inflatable by compressed air. To say the least, the proposition is not without interest to operators of mechanized foundries, where the supply of sand to the machine-moulders is liable to be interrupted.

Paddle-blade Fans. Catalogue No. 2M/ANH/1159 issued by the Midland Heating & Ventilation Company, Limited, Bedford Road, Birmingham 11, covering the Gyro-Flo type of paddle-blade fans, first discusses four typical mountings and follows with a performance correction table for when the fans are used at high altitude or high temperatures. The bulk of the catalogue is taken up with tables giving technical data, in great detail for 18 sizes of fans in which the impeller diameter increases in steps from 9½ in. to 60½ in. It is the type of catalogue that a buyer should keep in his library for reference.

Heat-treatment Furnaces. In folder No. M.4B, Metalectric Furnaces, Limited, Smethwick, Birmingham, describe and illustrate a range of standard box-type electric furnaces. They are made in four sizes, with ratings of 10-, 16-, 27-, and 42-kw., the operating range being up to 1,000 deg. C. An interesting feature is that the hearthplate is cast in the firm's own works from a nickel/chrome alloy. Special-purpose furnaces are available, with temperatures running up to 1,200 deg. C. and for these ceramic hearthplates are used.

Electric Cranes. Herbert Morris, Limited, Loughborough, have issued as a separate publication Section 10 of their general catalogue, which covers a wide range of electric cranes, reaching up to 200 tons lifting capacity. The first part of this well-produced brochure tells some of the places where they are made and how they are built. The second part illustrates actual installations, segregated into various weight-lifting capacities. Those of up to 20 tons capacity are shown as cage- and floor-operated. Included in the illustrations are several applications in foundries and steelworks.

Epoxide Resins. Bakelite Limited, 12-18 Grosvenor Gardens, London, S.W.1, have issued a new booklet entitled "Bakelite Epoxide Resins and their Applications" which outlines some of the uses of the comprehensive range of epoxide systems they market. The booklet is intended for use in conjunction with the large number of "advance information sheets" and "technical memoranda" already issued on specific applications of Bakelite epoxide systems. In this connection, the chart entitled "Guide to Publications on Bakelite Epoxide Resins," will be found useful.

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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Fifteen words for 7/6 (minimum charge) and 4d. per word thereafter. Box Numbers 2/6 extra (including postage of replies). Situations wanted 2d. per word throughout.

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

AVAILABLE early January. Well known Steel Foundry SUPERINTENDENT. Age 38. Capable full control. Expert in use of air setting oils. Box AE287, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT, Australian, 29, with wide experience in Australian malleable, grey iron and electric steel founding industry, together with US experience, seeks management position in UK in similar industry. Box FS307, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

TECHNICAL SALES REPRESENTATIVE required for Iron Foundry situated N.E. Applicants must have knowledge of Iron Founding and sales experience, hold current driving licence, age preferably under 35 years. Only those with the necessary qualifications need apply, with full details of experience and salary to:—Box TS304, FOUNDRY TRADE JOURNAL.

JUNIOR FOREMAN required in large South Wales Iron Foundry. Duties will include the supervision and training of apprentices and young moulders in greensand, drysand, and loam moulding. Applicants should have a wide knowledge of these methods as applied to the production of large high quality iron castings. Write giving details of experience, age, etc., to Box JF308, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for well established and expanding Whiteheart Malleable and Cast Iron Foundry near Wolverhampton. Important post requiring an experienced and first class production man for both bench and mechanised moulding. Applicants must be good at organising, trained in cupola and sand control, fully capable of estimating from drawings, used to working on own initiative, not afraid of work and responsibility. Applications for this pensionable position will be treated in the strictest confidence. Reply, stating salary. Box FM313, FOUNDRY TRADE JOURNAL.

CHIEF FOUNDRY METHODS ENGINEER

Required for Steel Foundry in Scotland, producing castings up to 10 tons. This position calls for a man having wide experience in the application of modern steel foundry techniques and in the running of a Methods Department. The post is regarded as an important one, and a salary commensurate with experien nce with

SITUATIONS VACANT—*contd.*

FOUNDRY ENGINEER and DESIGN DRAUGHTSMAN required by Coleman—Wallwork Foundry Equipment Division of Stone—Wallwork Ltd. Applications giving full details of previous experience to be submitted to 32, Victoria Street, S.W.1.

WANTED. A practical ROLLMAKER to take complete charge of a Roll Foundry making Straight Carbon, Molybdenum and Indefinite Chill Rolls also Hollow Rolls. Reply giving full particulars of experience and qualifications also stating salary required. Box AP309, FOUNDRY TRADE JOURNAL.

JOSEPH LUCAS (ELECTRICAL) LIMITED

have a vacancy for a

PROCESS DEVELOPMENT TECHNOLOGIST

to take charge of a department responsible for the development of improved processes and techniques for the control of pressure diecasting conditions. Experience of diecasting is desirable but not essential.

Applicants should preferably have a degree or equivalent qualification in science, engineering or metallurgy. The post is pensionable and a good starting salary will be paid.

Apply in writing, stating age, qualifications and experience to the Personnel Manager, JOSEPH LUCAS (ELECTRICAL) LIMITED, Great King Street, Birmingham, 19, quoting reference PM·D 355.

WORKS STUDY ENGINEER: Applicant should possess necessary education, qualifications, good personality and ability to get along with men, preferably, though not essential, backed up by several years' experience in application of method study, work measurement and incentive schemes. If Anne Shaw organisation trained, an added advantage.

Knowledge of basic principles underlining incentive schemes and standard costs desirable. Able to show evidence of ability, to analyse production problems objectively, and carry assignments to successful conclusion.

Pioneering post in progressive major manufacturing company situated in pleasant area within easy access of Central London, and operating latest equipment. Knowledge of its application to engineering, foundry and enamelling industry particularly desirable.

Training course could be made available to suitable candidate.

Position permanent. Pension Scheme facilities.

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SITUATIONS VACANT—*contd.*

METALLURGICAL CHEMIST and a MELTER with manganese steel experience for Rhodesian electric steel foundry. Box MC311, FOUNDRY TRADE JOURNAL.

STEEL FOUNDRY MANAGER

BROWN, LENOX & CO. LTD., require a MANAGER for their Steel Foundry at Pontypridd.

Applicants must be experienced in the manufacture of Carbon and Medium Alloy Steel Castings up to 3 tons in weight, and in all aspects of foundry management.

Age 40-45. Pension Scheme. House Available.

Apply with full particulars to the Managing Director,

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Pontypridd, Glamorgan.

PROJECT ENGINEERS. The Stanton Ironworks Company, Limited, near Nottingham, has vacancies for two Project Engineers for work at its Spun Iron Pipe plants. Applicants should be graduate engineers or hold equivalent qualifications and preferably be aged between 25 and 30. The posts are permanent and pensionable. The engineers selected will be engaged initially on work at Stanton but may ultimately be required to work overseas. Preference will be given to those prepared to travel abroad. Write, in confidence, to the STAFFING OFFICER.

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WANTED. Room Type Shot Blast Plant. In good second hand condition. Approximately 12 ft. × 8 ft. × 8 ft. complete with Dust Extractor, etc. QUALTERS & SMITH BROS. LTD., Barnsley, Yorks.

URGENTLY WANTED—One pair Cupolas with Charging Hoist and Sp.A. 4 ft. 6 in. to 6 ft. Shell Dia. Wheelabrator. HPL 1 Moulding Machines. No. 1 and 2 Sand Royers. Sandmills, 3 ft.—6 ft. Dia. Geared Ladles, 30 cwt. to 5 ton. FRANK SALT & Co., LTD., Station Road, Blackheath, Birmingham.

FOUNDRY Sand Testing Equipment required particularly for green strength and permeability. Must be in good condition.—Box FS285. FOUNDRY TRADE JOURNAL.

WANTED.—LABORATORY type sand mill batch quantity approximately 20 lbs. DRAKES, LTD., Shay Lane, Halifax, Yorkshire.

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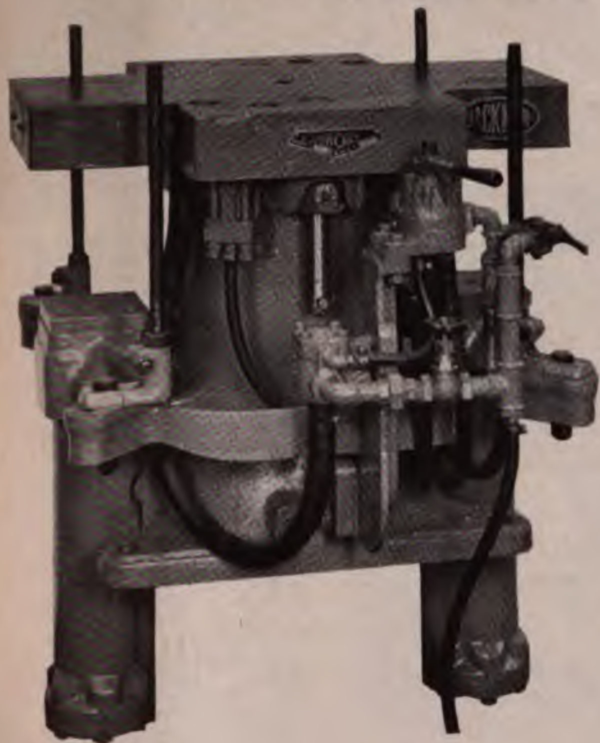

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Jolt Cyl. Dia.	3½"	4"
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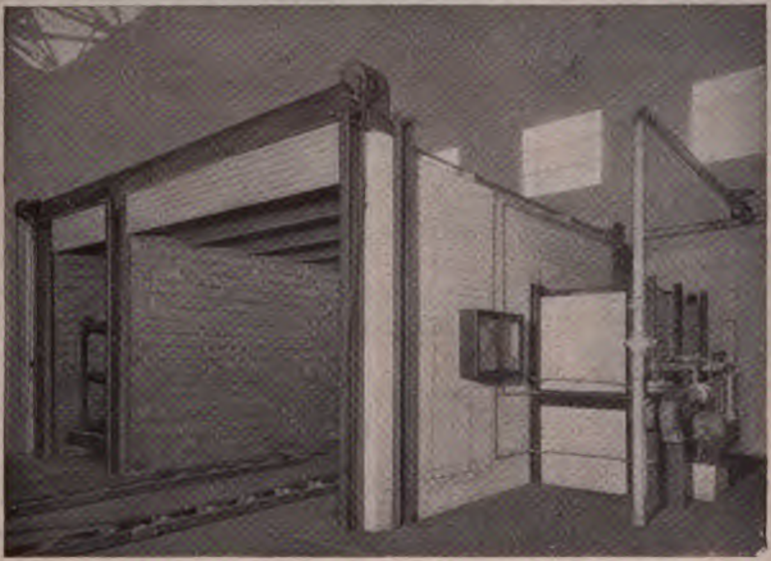

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